

SUTURE TECHNIQUE FOR SMALL WOUNDS

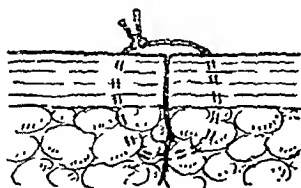
By J. R. LEARMONTH, C.B.E., CH.M., F.R.C.S.ED.

Professor of Surgery, University of Edinburgh.

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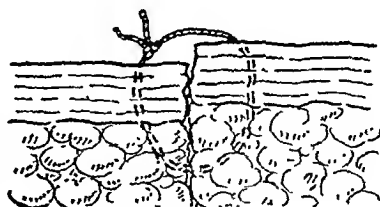
In order to secure sound healing, with a minimum of visible scar, certain general rules must be observed:—

- (1) Needles and suture material should be the finest available.
- (2) Needles should have sharp cutting edges. If they are sterilized by boiling, the edges should be protected by passing the needles through a square of lint or gauze; alternatively, needles may be kept in a mixture of lysol three parts and spirit one part, from which they are removed by forceps and rinsed in sterile water before use.



CORRECT

FIG. 1.—Suture: showing equal bite of tissues on each side.



INCORRECT

FIG. 2.—Suture: unequal bite of tissues on the two sides, giving a difference in level and inaccurate apposition.

- (3) Either curved or straight needles may be used; no. 6 is a convenient size.

- (4) The "bite" taken should be the same width (about $\frac{1}{4}$ in.) and depth on both sides of the wound (fig. 1); otherwise the scar is uneven, which is particularly noticeable in artificial light, because of the shadow cast by the raised edge (fig. 2).

- (5) The skin edges should not be inverted or grossly everted by the suture.

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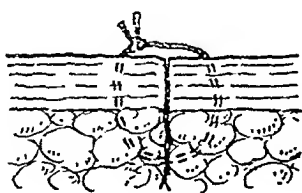
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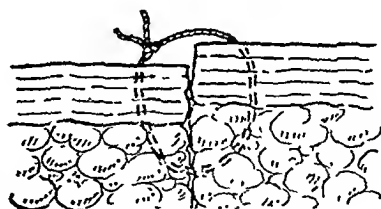
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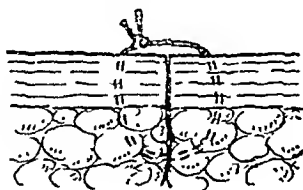
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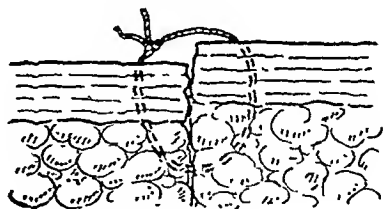
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INTERRUPTED SUTURES

(1) *Simple interrupted suture*.—This is the most frequently used suture. The bite should include the whole depth of the wound, to avoid stretching of the scar afterwards (fig. 1). It is generally placed by the method of

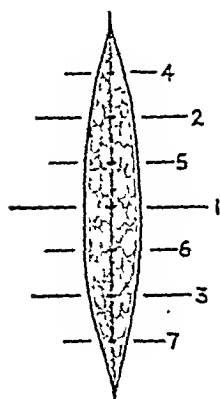


FIG. 3.—Method of halving: order of insertion of sutures.

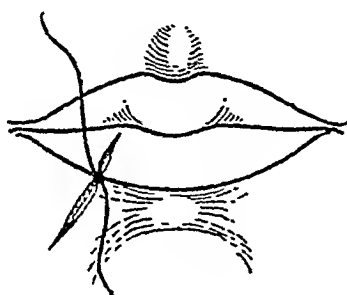


FIG. 4.—Suture of lip: first stitch at muco-cutaneous border.

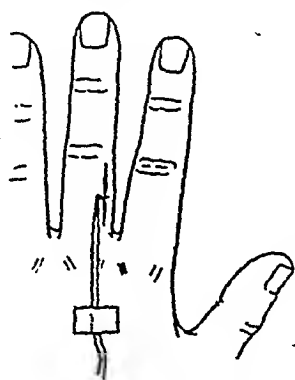


FIG. 5.—Suture of side of finger: ends left long and strapped to dorsum.

halving, i.e., the first suture is placed at the midpoint of the wound, and successive sutures at the quarters, eighths, and so on (fig. 3); thus the sutures

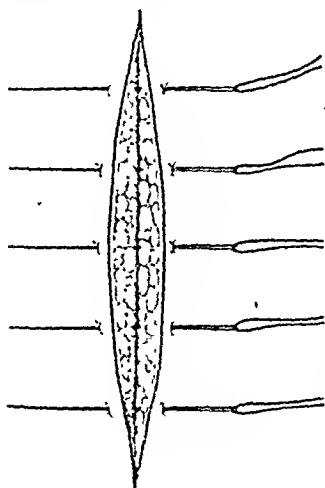


FIG. 6.—Precise apposition by insertion of all needles before complete withdrawal of any stitch.

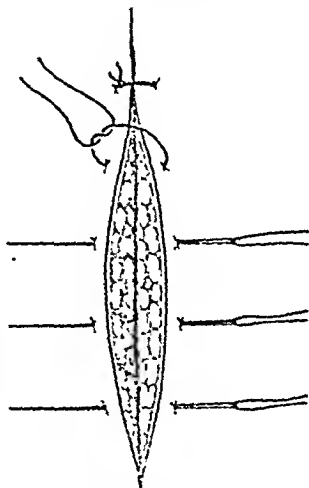


FIG. 7.—Needles withdrawn one by one and stitches tied.

will be equidistant and the wound uniformly supported. However, an irregularly placed suture may be used to control bleeding from a vessel just

under the skin, for example, in wounds of the scalp; and in wounds involving the lips the first suture is placed accurately at the vermilion border (fig. 4). Knots are always tied to one side of the wound (fig. 1), and not over it. Sutures should not be cut so short that the ends cannot be grasped by the forceps used in their removal, especially when the loop of the suture is small (e.g., about the face). When the projecting ends may irritate adjacent surfaces, e.g., between the fingers, they are left long and carried out of harm's way, where they are fixed by plaster (fig. 5).

(2) *Interrupted sutures on straight needles*, when all the needles are passed

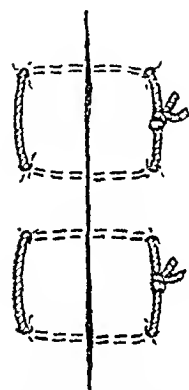


FIG. 8.—Interrupted mattress sutures.

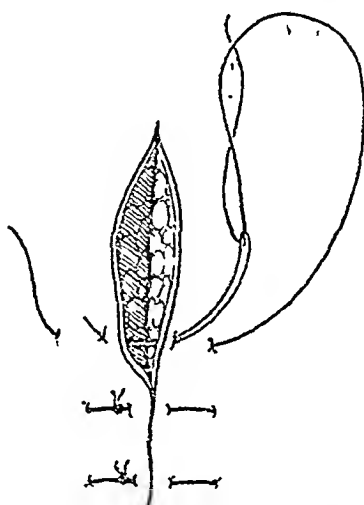


FIG. 9.—Interrupted vertical mattress sutures.

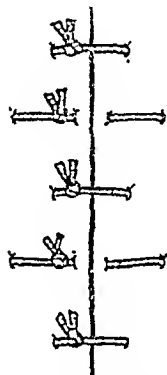


FIG. 10.—Precise apposition by alternation of vertical mattress and simple sutures.

before any suture is tied (fig. 6 and 7). By this method the edges of the skin may be adjusted very neatly, and it is therefore valuable in wounds of the face.

(3) *Interrupted mattress sutures* (fig. 8).—These control bleeding, for example, in wounds of the scalp, and are occasionally useful singly; but on account of this hæmostatic action, they are apt to produce slight necrosis of the skin in their grasp.

(4) *The interrupted vertical mattress suture* is the most generally useful of skin sutures. It takes first a broad, deep bite of the edges, and on its return a small bite of each edge (fig. 9). Thus it secures wide coaptation and accurate apposition. To obtain the best result, the knot should be placed close to the small bite. It may be used for the whole wound, or it may be supplemented by regularly inserted simple sutures (fig. 10). Alternatively the skin edges may first be adjusted by a small bite which is secured by a "surgeon's"

knot; the large bite is then taken, and the ends finally tied in a reef knot (fig. 11).

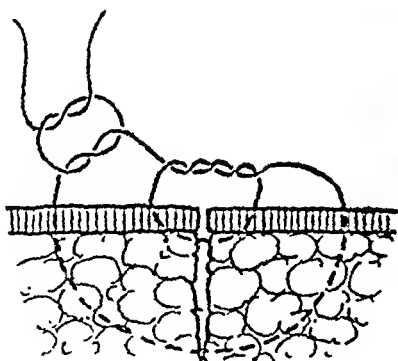


FIG. 11.—Skin and deeper layers separately apposed by superficial and deep bite: superficial portion tied by surgeon's knot; superficial and deep portions tied together by reef knot.

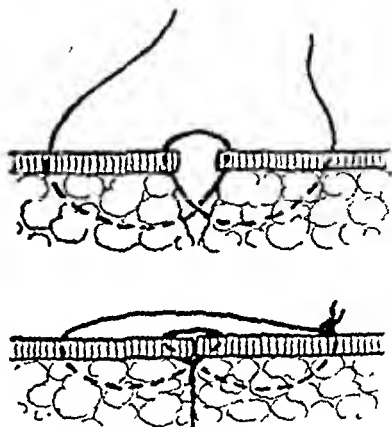


FIG. 12.—Figure-of-eight suture for use where tension is great.

(5) When there will be a certain amount of tension on the wound edges, with a tendency to gaping, the strain may be taken from the healing wound

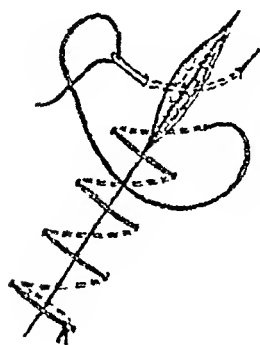


FIG. 13.—Continuous suture: exposed portions vertical to line of wound.

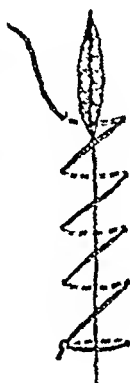


FIG. 14.—Continuous suture: exposed portions cross line of wound obliquely.

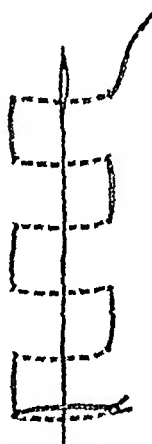


FIG. 15.—Continuous mattress suture everting wound edges.

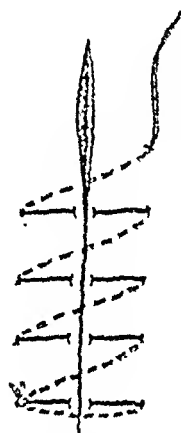


FIG. 16.—Continuous vertical mattress suture.

by the use of the suture shown in fig. 12. The grasp of the large loop protects the approximating small loop.

CONTINUOUS SUTURES

(1) *Simple continuous sutures* are of two types, according to whether the exposed part of the suture is perpendicular to the suture line (fig. 13) or the buried part (fig. 14). The former method produces the neater scar. When working alone, an operator may have difficulty in maintaining the turns of the suture at an even tension; this is best accomplished by inserting two turns before gently drawing the suture to the desired tension. The suture is also a good hæmostatic one.

(2) The *continuous mattress suture* has the advantage of everting the edges

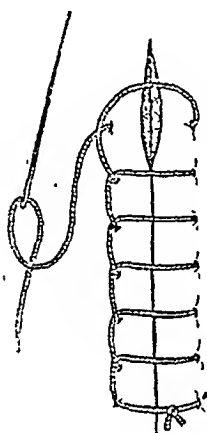


FIG. 17.—Blanket suture.

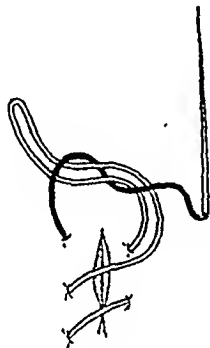


FIG. 18.—Completion of suture by reef knot.

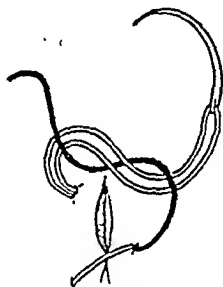


FIG. 19.—Completion of suture by running knot.

of the wound (fig. 15). This does not result in a neat scar, but may be advisable in areas where the skin is hard to sterilize, and keep sterile, e.g., the groin, the axilla.

(3) The *continuous vertical mattress suture* is easily and quickly introduced, and provides for both broad coaptation and accurate apposition (fig. 16). It leaves a very fine scar which is not liable to stretch.

(4) The *blanket suture* has the advantage that it is locked at each turn of the suture, so that it is a useful stitch for a single-handed worker (fig. 17). It coapts neatly, and the part of the stitch which lies parallel to the wound exerts some hæmostatic action. It should therefore (e.g., on the scalp) be placed when possible on the "cardiac" side of a wound.

Any form of continuous suture may be secured at its completion by either of the methods shown in fig. 18 and 19.

SPECIAL SUTURING

(1) To close the apex of a triangular wound, the best method is a vertical

mattress suture which includes in its grasp only the subcutaneous tissue of the flap (fig. 20).

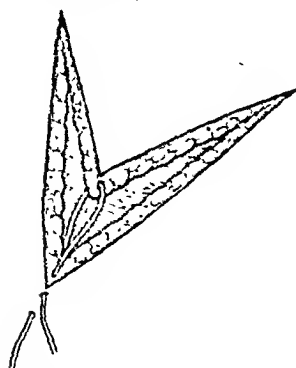


FIG. 20.—Apical subcutaneous suture for angled wound.

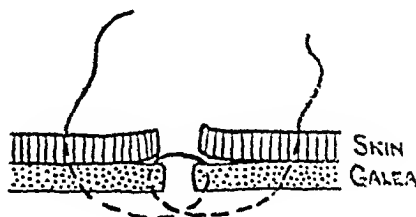


FIG. 21.—Figure-of-eight suture for scalp.

(2) When there are two layers in a structure, as in the scalp (skin + galea), a figure-of-eight suture may be employed to secure apposition in both (fig. 21).

REMOVAL OF SUTURES

Sutures on the face should be removed early—alternate sutures on the second day, and the remainder on the fourth day. Elsewhere, sutures may remain for seven days. If any difficulty is encountered, the cut stitch should be left in place for a further twenty-four hours, when it can usually be withdrawn easily.

STRAPPING METHODS OF WOUND APPPOSITION

In incised wounds, sutures may sometimes be avoided, provided there is no risk of tension, by the application of a bridge of adhesive or of waterproof strapping as in fig. 22. The strapping bridge is narrowed at the point where it crosses the wound, and broadened where it is attached to the skin clear of the wound. Longer shallow incised wounds may be painlessly closed by apposition if a strip of sterile waterproof adhesive is applied to each side of the wound, its edge parallel to and directly overlying the edge of the skin incision. The strips of strapping can then be drawn together by a continuous suture (fig. 23).

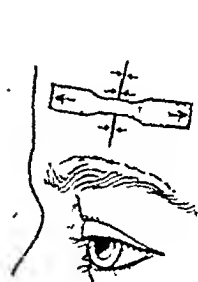


FIG. 22.—Strapping bridge as alternative to suture.

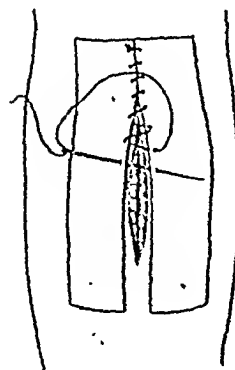


FIG. 23.—Suture of strips of strapping applied to wound edges.

SUTURE MATERIALS

In the suture of all skin wounds a non-absorbable suture material should be used. Fine silkworm gut, silk thread, or nylon are equally satisfactory, and all these can be sterilized by boiling. The only situation which demands a catgut surface suture is the buccal mucosa in wounds of the lining of the cheeks, the tongue, or the floor of the mouth. In these situations no. 0 catgut is usually suitable.

DRESSING AFTER SUTURE

When the wound has been closed, the skin surface in which it lies is cleaned by gentle wiping with gauze soaked in sterile water or saline. After washing with weak dettol, a dry dressing of gauze may be applied. If the wound is a

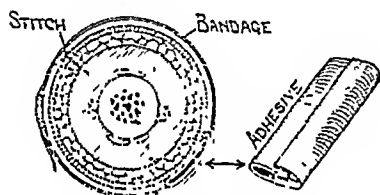


FIG. 24.—Adhesive anchor for bandage of a limb.

large one, and if the skin has been closed over much dead space, a pressure dressing is desirable, and this can conveniently be obtained by a firm pad of cotton-wool applied to cover and to overlap the gauze dressing. The dressing may be kept in place by elastic strapping or by the more modern water-proof strapping, which is highly adhesive, sterile, and inconspicuous. For larger wounds, particularly in the extremities, a circular bandage may be used. To avoid vertical movement of such a circular bandage, a doubled strip of adhesive strapping may be used on the surface of the limb diametrically opposed to the wound, to fix the bandage to the limb surface, as in fig. 24. A useful strapping dressing for the terminal portion of the finger is illustrated in fig. 25.

Of course, for wounds of the mucous surface of the buccal cavity no dressing is required, but frequent mouth washes should be recommended for their lavage value.

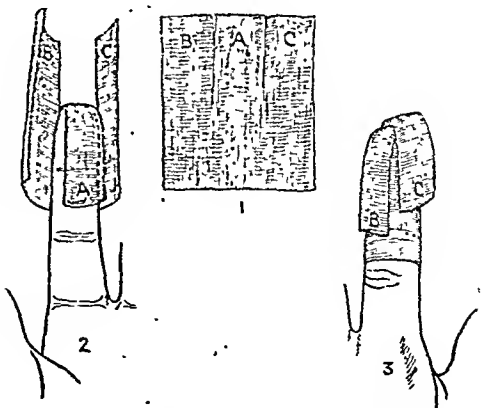


FIG. 25.—Application of plaster to finger tip.

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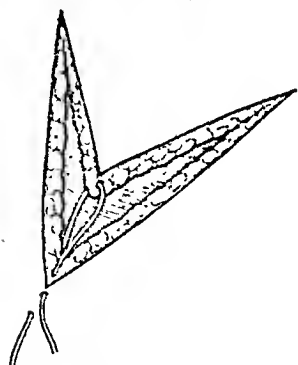


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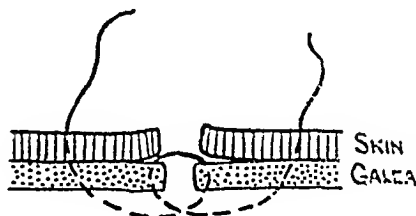


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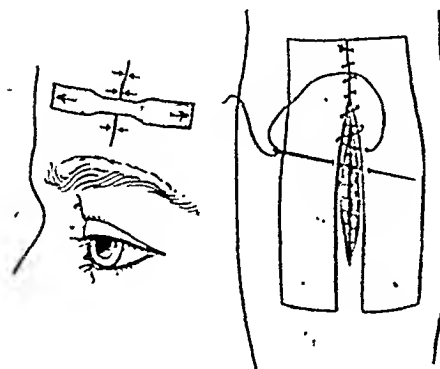


FIG. 22.—Strapping bridge as alternative to suture.

FIG. 23.—Suture of strips of strapping applied to wound edges.

below the deep fascia, as in the muscles of the thigh, bruising may never show externally, or may appear two to three weeks later at some distant point lower down the leg where the blood has gravitated, or show at the termination of a fascial sheath. The swelling is œdematous and not infrequently pits on pressure, whilst considerable tenderness and pain can be elicited, both by pressure and movement of the affected part.

Treatment consists in the application of a pressure bandage, applied from below upwards over the swelling and the tissues both below and above this. Such bandaging limits the hæmatoma and secures efficient support to, and sufficient rest of, the injured tissues. If intense pain is present with a large and tense hæmatoma, this should be aspirated through a large-bore needle under full aseptic precautions. Aspiration seldom needs to be repeated if pressure is applied evenly over the whole area. It is wise to rest the part for two to three days, if necessary by keeping the patient in bed, but splints should never be applied. At the end of this short period gentle active movements and massage should be instituted, and the patient encouraged to increase the use of the affected area, which should be completely recovered in from seven to twenty-one days, according to the extent and severity of the contusion inflicted.

It is interesting to note that the practice of applying raw meat to a black eye and other areas, with the object of drawing out the blood and removing its unsightly appearance, dates far back into antiquity, having been employed by the Egyptian, Greek and Arab physicians, although its value throughout the ages, as at present, is somewhat dubious.

Complications of a contusion are seldom met with, but it must be remembered that when skin is abraded, or even only crushed, infection is likely to occur, due usually to the *Staphylococcus albus* from the damaged skin, but maybe to any organism. Such infection is indicated by throbbing pain and raised temperature, œdema and redness, which in streptococcal infections may spread rapidly (erysipelas). Treatment consists in resting the inflamed tissues, if necessary by splintage, although this is seldom required, and the administration of penicillin by injection, 10,000 to 15,000 units intramuscularly, every three or four hours; or sulphonamide (preferably sulphathiazole) by mouth, 2 gm. four-hourly for forty-eight hours and then 1 gm. t.d.s., until the temperature falls. It must, of course, be ascertained, in co-operation with a bacteriologist, that the organism is penicillin- or sulphonamide-sensitive. Should an abscess form, it must be incised and drained.

SPRAINS

As already stated, no sprain can occur without an accompanying contusion of the soft parts around the injured joint. A sprain consists in the wrenching of the soft tissues around the joint, usually by indirect violence, and is therefore liable to be accompanied by tearing off of fragments of bone, or even fracture of the bone in the neighbourhood of the damaged joint. In

CONTUSIONS AND SPRAINS

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THE vital importance of the prompt and efficient treatment of contusions and sprains has engaged the medical profession's attention since the earliest days of its existence, as is evidenced in the Edwin Smith papyrus which was written somewhere about 1500 B.C., and gives a detailed account of the treatment of contusions and sprains as practised in ancient Egypt. It is regrettable that this papyrus, which systematically describes these conditions from the head downwards, terminates between the umbilicus and the perineum, so that there is no record of how sprains and contusions of the lower extremities were treated. In the main, however, it is obvious that the treatment in those ancient times, apart from incantations and spells, was much the same as that carried out by the profession to-day.

Throughout the ages, and especially during time of war, surgeons and, of course, patients have been much exercised as to the best treatment of contusions and sprains, and although it is true that war is now over—it is hoped and trusted for ever—there still remain the risks and dangers of accidents from motors, from flying, and the everyday incidents of a busy life: accidents which are much aggravated by the influence of alcohol on the individual. It is of vital importance to the community that all manpower should be available at the present moment, and it is therefore most important that the medical profession should take every precaution to ensure adequate treatment, constant care and proper rehabilitation of all such cases, so as to fit the patient to return as early as possible, and with a good result, to the work from which the accident has temporarily removed him.

CONTUSIONS

A contusion may occur without a sprain if the site of the injury is not near a joint, but never can a sprain occur without a contusion, with its effusion of blood and serum into the tissues and resulting œdema and impairment of movement in the soft tissues around the joint. This is an important factor to remember in dealing with sprains, and a potent reason why fixation in splints and immobilization of the damaged joint should be avoided in all cases. A contusion results from a transitory force rather than from direct violence, and gives rise to a bruise or, if larger vessels are broken or a space exists in which blood can collect, to a hæmatoma. The skin may be abraded but is seldom completely divided, so that no true wound exists; but it must be remembered that the hæmatoma or bruise often occurs in and around the tissues which have been wounded, especially if that wound has been inflicted by a blunt instrument or considerable tearing violence.

Clinically, there is pain, swelling, tenderness of the part and inability or unwillingness to use it, whilst bruising may or may not be present, according to the degree of the hæmatoma; and indeed, when such a hæmatoma is

marked over the region of the damaged ligament, which will frequently serve to enable the practitioner to be fairly confident that there is no underlying fracture of the bone, in which event œdema is present equally all around the joint and movement is equally painful in all directions.

Treatment of all sprains consists in strapping (and in this respect zinc oxide strapping is, in my opinion, more satisfactory and gives greater relief than elastoplast) to relax the injured ligament; for example, in the case of the lateral ligament of the ankle joint, the foot is strapped in eversion and either dorsal or plantar flexion, according to whether the anterior or the posterior fasciculus is damaged. The patient should be encouraged from the outset to use the joint gently; in the case of the lower limb, without weight bearing for the first week or ten days if the sprain is at all severe. The application of physiotherapy, to aid the movement of the injured and other joints and to assist the absorption of the œdema, is a valuable means for directing the patient's efforts into proper channels. In some cases, when a particularly painful spot is present, local anæsthesia, in the form of an injection of 5 to 10 c.cm. of 1 per cent. novocain, may be of value, but I think caution is necessary in allowing such anæsthetized patients to use a limb early and without support, as the damaged ligament is inclined to heal in a stretched position and may give rise to considerable and lasting trouble and arthritis. It must be remembered that in every sprain, bruising of the articular surfaces is bound to occur and some effusion be present in the joint. This will, in most cases, absorb with no ill-effects, but in others, and especially in elderly patients with a tendency to arthritis, persistent pain and recurrent effusion may occur as a result of traumatic osteoarthritis subsequent to the injury.

The *prognosis* of most sprains is good if active treatment on the lines suggested is followed, and the majority of patients suffering from sprains should be able to return to work in from ten to twenty-one days, according to the severity of the injury. A patient who is not back at work at the end of five to six weeks needs careful investigation, with perhaps movement under anæsthesia to break down local adhesions. This manipulation must be carried out on possibly more than one occasion; as soon as one snap occurs it must be stopped, otherwise, if many adhesions are broken down at once, the reaction set up will enable more adhesions to form before the active movement, which should begin immediately after manipulation, can be instituted.

CONCLUSION

These are by no means minor surgical troubles, and call for all the skill and ingenuity of the practitioner to procure the excellent results which are so essential to the well-being of the patient. Such results will not be obtained by misguided treatment, by splinting and bandaging for prolonged periods, nor by permitting the injudicious use of severely sprained joints without proper support for the damaged ligament.

children the epiphyses may be partly or completely detached. It is therefore essential that in every case of sprain an X-ray should be taken in two planes so as to eliminate the possibility of the presence of one of these sprain fractures, for, although in many cases the treatment of a sprain fracture is identical with that of the torn ligament which constitutes the sprain, complications may arise in such cases, for which the practitioner will be held legally and financially liable should an X-ray not have been taken when the case was first treated. Moreover, fissure fracture can be detected only by X-ray examination, and is not uncommon as an accompaniment of severe sprains, as in the fissure fracture of the tibia in the case of a sprained ankle.

The ankle is the joint most usually subject to sprain, and particularly so with women wearing high-heeled shoes. The usual injury in these cases is rupture of one or more of the three fasciuli of the lateral ligament, but either of the median ligaments may be torn, usually in its anterior part. The site of the rupture is indicated by the point of extreme tenderness, and usually by an additional swelling in this region, whilst any attempt to stretch the damaged ligament is resented by the patient and is productive of considerable pain. Other joints also are liable to sprains, and it must be remembered that if the violence is great, dislocation may occur, which is particularly the case in both the shoulder and the elbow. X-ray examination is therefore again an essential, lest displacement of the bone should have resulted from the violence, in which event immediate reduction by suitable methods under anæsthesia should be undertaken.

Sprains of *the wrist or carpus*, although not so common as a Colles's fracture, do occur, and call for strapping to rest in relaxation the torn ligaments, usually the lateral. When X-ray examination shows that no fracture is present in the radius or carpus, judicious exercises and use should be started within a day of the injury.

Sprains of *the interphalangeal joints*, especially the terminal, are often sprain fractures, as shown by X-rays or by the fact that the extensor attachment is torn from the distal phalanx, which is semiflexed and cannot be extended (mallet finger). Treatment in such cases is to flex the finger and its neighbours, if necessary fully into the palm (when the terminal phalanx can be flipped to and fro), and strap or fix with plaster of Paris the damaged terminal phalanx in hyperextension, i.e., resting against a surgical sponge or pad of cotton-wool and maintaining it there for three weeks, when union will have occurred and the finger can be released and gentle exercises begun. By these means a good result can be anticipated, but never, in my experience, by open operation.

As already described in discussing sprains of the ankle joint, *physical signs* are those of extreme tenderness over the torn ligament, combined with swelling and inability to use those muscles which move the joint, so that the damaged ligament is stretched. It is a noteworthy fact that swelling is more

is more likely to bleed profusely than a lacerated wound. The profuse hæmorrhage may lead an enthusiastic first-aid worker to take an alarmist view of the situation and apply a tourniquet, which, if tight enough to stop the peripheral circulatory flow, is dangerous, and if too loose will increase the flow of blood. A tourniquet has no place in the treatment of superficial wounds.

Tetanus.—What are the chances of the development of tetanus in the superficial wound? This is not known, as there can be no collection of an adequate and representative number of cases. It is thought to be small, but when tetanus does develop the result is a calamity. The only safe procedure would be to assume that every wound was infected with *B. tetani*, and also that every such infected wound was liable to give rise to tetanus. Such an assumption is made in battle casualties, but in wounds received in civilian life a like assumption is not justified. True, *B. tetani* is very widely distributed, but the nature of civilian wounds is not so conducive to the growth of the organism as are the deeper, more extensively lacerated wounds of warfare. The wound in which tetanus is likely to develop is one which involves deeper structures, especially muscle, and which has been contaminated with soil and is of the lacerated type. The wound which bleeds freely is less likely to be contaminated than the one which does not. Blood extravasated into the surrounding tissues also forms a favourable nidus for growth of the organism. If during the first few days after injury the wound shows increasing induration, a slight watery discharge and an "unhealthy" appearance, a prophylactic dose (3,000 international units) of anti-tetanic serum should be given by intramuscular injection.

TREATMENT OF THE SUPERFICIAL WOUND

What improvement in the treatment of wounds can be offered from the vast experiences obtained in World War II? It has been learned (1) that the danger of further infection of a wound by careless and oft-repeated handling, probing and dressing, is a real one, and all these procedures must be avoided or reduced to an absolute minimum; (2) that no solution, powder or gas applied locally can *by itself* "sterilize" an already infected wound; (3) that removal of all dead and devitalized tissue is essential before biological repair of a wound can take place; (4) that mechanical rest during the early stages of healing is a potent adjuvant to nature's powers of repair.

First-aid treatment.—The objects of such treatment are to arrest bleeding, and to seal the wound against outside infection. For the former, a firmly applied bandage over a liberal pad of cotton-wool is sufficient. Mechanical cleansing—but not scrubbing—of the surrounding skin with cotton-wool moistened with water containing a mild disinfectant, or with ether, should be done. The wound should not be washed, but in order to prevent soiling it should be covered by dry gauze which is held in position during the

SUPERFICIAL WOUNDS

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"SUPERFICIAL" wounds may be defined as those which involve the skin and subcutaneous tissues, but which, so far as can be estimated, do not involve deeper structures, such as muscle or bone. They are of frequent occurrence in civilian practice, occurring in children while at play, in adults in industry, in road accidents, and in domestic life. Although there can be no statistical evidence as to their frequency, experience reveals that they are common. A large number are not seen by the practitioner, being treated by the mother, a friend or the industrial nurse. Some are not treated at all. The majority heal without delay or disability, and only the more serious cases come under the care of the practitioner, who is therefore inclined to develop an exaggerated view of their gravity. The same applies, to an even greater degree, to the consulting surgeon who sees only those which develop unforeseen and dangerous complications. When, however, serious complications do occur, they are so dramatic and impressive as to warrant continuous alertness in their prevention and early diagnosis.

RELATIONSHIP TO MORE SERIOUS LESIONS

The first problem which confronts the practitioner must be—"Is this only a superficial wound or are more serious complications present?" Immediately after the receipt of an injury, a superficial abrasion may be all that is evident, but injury to an important internal organ may have occurred. In the limbs a wound which appears to be quite superficial may be the only outward sign of injury to structures such as the larger blood vessels or nerves. The superficial wound must therefore be looked upon as an important signpost indicating the necessity for a thorough investigation in order to exclude more serious injuries. In this connexion a detailed history of the causal factor may be helpful. The type of instrument causing the wound—was it sharp or blunt? What force was probably applied and was the application for a long or short time? The time necessary for obtaining as full a history as possible, even taking a great deal of trouble to get from the patient or from witnesses reliable information as to how exactly the wound was caused, will be well spent. It will often help to avoid that disastrous error of treating lightly what turns out later to be a serious or lethal injury.

Hæmorrhage from a superficial wound is often profuse, especially in the face and scalp regions. This naturally alarms the patient and his relatives, but can, as is well known, be arrested by evenly applied light pressure. The incised type of wound, whether caused by a sharp or blunt instrument,

be removed. It is better to err on the side of conservatism than of wide excision. Wounds caused by household utensils, e.g. tin openers, are liable to be infected and should not be stitched, and the same applies to those caused by carpenter's tools.

If there is any doubt regarding the wisdom of primary stitching, the method of *delayed primary suture* should be adopted. Under local anæsthesia the wound is gently opened up, foreign material swabbed away, and any obviously dead tissue removed. Stitches are then inserted but not tied, and the wound is lightly packed with gauze. Two to four days later the pack is removed and, if there are no signs of inflammation, the stitches are tied, bringing the edges together.

Various drugs have been used locally to control possible sepsis—proflavine, sulphonamide, penicillin or a combination of these—and all have been extensively used with benefit. The choice is a personal one, and will depend upon personal experience. Impregnation of the gauze with petroleum makes its removal much less painful.

The decision whether the wound should be closed or not at the first dressing depends upon its appearance. If it looks healthy it can be safely closed. The presence of a small quantity of pus does not necessarily contraindicate closure, and bacteriological examination of smears from the wound surface is not necessary.

In some cases the practitioner will feel that adhesive plaster applied transversely in strips to the wound will not only give good approximation but also support, where there is a tendency to gaping. In such a case he may be able to dispense with stitches.

SUPERFICIAL ABRASIONS

For the first few days these may cause the practitioner some anxiety. Although as a rule healing takes place under the scab, occasionally an acute streptococcal infection intervenes. This must always be carefully watched for, and appropriate treatment instituted at the earliest sign. If the organism is penicillin-sensitive the parenteral administration of the drug should be started at once.

Local treatment consists of gentle removal of any foreign material, e.g. grit, and the application of a thin layer of a bacteriostatic agent, e.g. sulphonamide or penicillin, in the form of a powder or ointment. Vaseline gauze and a liberal, evenly applied pad of cotton-wool completely surrounding the whole limb and extending well above and below the injured part are carefully adjusted. A domette or web-bandage placed firmly over the dressing acts as a splint to ensure rest, and also gives compression to control the reactionary œdema which invariably follows trauma. The dressing should not be touched for from four to seven days unless there is increasing local pain or constitutional symptoms, such as fever and rapid pulse, indicating sepsis. The limb should also be well elevated from the

cleansing of the skin. The protecting pad is removed, and a temporary dressing applied. This may consist of dry, sterilized, unmedicated gauze, "tulle gras", or gauze impregnated with sulphonamide. Penicillin cream applied in emergency circumstances is dangerous, as contamination by penicillin-resistant organisms from clothing, mud, or the practitioner's own hands, is likely to occur. Wet dressings containing disinfectant, e.g. proflavine, eusol, are not recommended under emergency conditions, as their sterilizing powers are negligible, and their preparation and application increase the danger of extraneous infection.

Subsequent treatment.—When the patient has been moved to more favourable surroundings, a more thorough examination can be carried out, and a decision reached as to whether the practitioner will advise treatment in a hospital or whether he will undertake treatment himself. This will depend upon the extent of the lesion, and also upon the suspicion of injury to deeper structures.

STITCHING OF SUPERFICIAL WOUNDS

In the incised wound caused by a sharp, not grossly contaminated, instrument, the edges should be brought together by stitches or by metal clips. Stitches should be interrupted and placed at wide intervals. The temptation to insert too many sutures in order to obtain complete skin-edge approximation should be resisted, as spaces between sutures are necessary for the drainage of serum. The vertical mattress suture (fig. 1) ensures eversion of the skin edges, and gives a better wound.

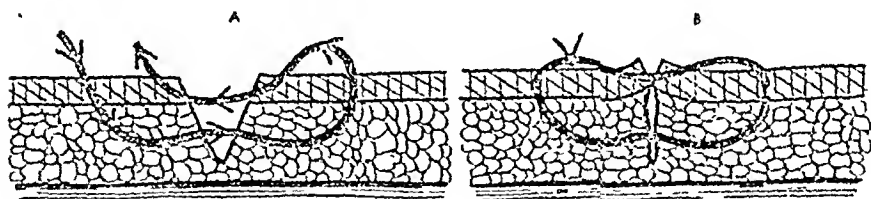


FIG. 1.—Vertical mattress suture: (A) inserted; (B) tied.

The injection of the tissues for an inch around the wound with local anæsthetic (1 per cent. planocaine) allows of a more deliberate, accurate and comfortable closure of the wound. Planocaine, 1 per cent., is injected, using a very fine hypodermic needle, which is inserted at intervals through the wound surfaces into the tissues on each side. This method is much less painful than the injection of the anæsthetic solution through the skin some distance from the wound. The needle is made to enter the surrounding skin from its deep surface, and blanching should be seen as the fluid is injected. Large quantities of anæsthetic solution are not necessary, and will cause discomfort from excessive pressure in the tissues, especially if injected quickly. Only if the skin edges are discoloured should any tissue

operation. Such material, fixed by long exposure or by boiling, forms an excellent protection to organisms against future attempts on their lives.

Masks.—To be efficient, masks must contain an impervious material, such as cellophane. The placing of a few thicknesses of gauze over the mouth and nose or the mouth alone does not prevent "spray" infection, when such is present, from the respiratory tract of the practitioner. The use of an efficient mask in the treatment of minor wounds is not necessary unless the practitioner is suffering from an acute cold. During the operation he should avoid talking, sneezing or deep breathing.

Sterilized gloves.—The use of rubber gloves in surgery is an added protection to the patient and to the surgeon. Are they necessary for the type of surgery under consideration? If the skin of the surgeon's hands is intact, and has not been contaminated within the last few days, systematic washing in "still" water with a liberal supply of soap will be sufficient. Prolonged scrubbing with nail brushes (10 to 15 minutes), which was for many years a ritual, has been found to be harmful, as it not only opens up paths of infection from the deeper layers of the skin, but causes abrasions of the skin of the hands. After removal of the gross dirt the water should be changed and a second washing carried out. The whole process should not last more than five minutes. The use of a disinfectant after washing is of doubtful value, and, if the solution is irritating to the skin, is harmful. Immediately after washing, the hands should be dried with a clean towel. If the skin of the surgeon's hands is not intact, rubber gloves are necessary. It is difficult to preserve dry sterilized gloves for long periods, as the rubber tends to deteriorate, and the occasional operator will find that they tear, or that the fingers are "stuck" just when he requires them. To avoid this annoyance, the following technique is recommended:—

At the end of an operation the gloves, still on the hands of the operator, are thoroughly scrubbed with soap and a nail brush. They are then dried and removed. Later, more thorough drying on both sides is carried out, and any small puncture is sought for and repaired. The gloves, well powdered inside and outside, are placed in a clean towel until again required.

After careful washing and drying of the hands, the gloves are put on and again washed in clean water or in a disinfectant solution. The use of recently boiled gloves, in the circumstances, is "messy", often impracticable, and even dangerous if accidentally punctured during the operation.

beginning of treatment, to encourage lymph flow. In doing this, care must be taken not to obstruct the flow, as will happen if the lower limb is placed on pillows, thereby causing obstruction at the groin by flexion of the hip. It is better to allow the limb to lie flat, and raise the end of the bed. In wounds of the upper extremity the limb may be placed comfortably on pillows, the shoulder being abducted. If the wound is extensive, or is in the vicinity of a joint, more prolonged and more controlled rest may be called for; this is best procured by the application of a light plaster of Paris cast applied over a well-padded limb and extending well above and below the affected area. The cast should be bivalved as soon as it is dry. This avoids the grave danger of vascular constriction due to reactionary swelling, which always occurs to a greater or less degree, and does not interfere with the efficiency of the cast as an instrument of rest.

MIXED INFECTION

The danger of infection of wounds from outside sources by organisms which were not present at the time of wounding is great. Such organisms as streptococci, *B. coli*, *B. proteus*, *B. pyocyaneus*, may prove to be very resistant to treatment, and may cause serious ill-health and prolongation of convalescence. The sources of such infection are many and varied—contaminated clothing, blankets, air, or the surgeon's hands—and must be continually borne in mind during the handling of open wounds. An elaborate ritual is possible only under hospital conditions when a sufficient number of trained personnel and special equipment are available. For the practitioner treating a simple superficial wound alone in his consulting room, such a technique is impossible, and if attempted will give rise to a sense of false security and will therefore be dangerous. If the common sources of such added infection are remembered, more simple methods will do much to prevent it.

Exposure of the wounded area.—This should be widely carried out as the preliminary act and made secure against movement. Well laundered towels and coats are unlikely to be contaminated, and form an efficient barrier against infection from the clothing of the patient or of the practitioner. Macintoshes are dangerous, as, if they are contaminated, it is impossible to sterilize them. They should therefore be covered by towels.

Instruments.—These should be sterilized by boiling. The keeping of instruments such as syringes, needles, scissors and scalpel blades in strong disinfectant solutions, e.g. methylated spirit, lysol, carbolic acid, does not guarantee sterility and causes erosion of the fine cutting surfaces. Such instruments are not "spoiled" by boiling, provided care is taken to prevent the edges from being rubbed against other instruments or the sides of the sterilizer during the process. An important part in the maintenance of bacteriologically clean instruments is the removal of all albuminous material, such as pus or blood, by thorough washing as soon as possible after the

MINOR DISLOCATIONS

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THE subject matter of this article deals mainly with some of the common subluxations and dislocations of the joints and extremities. A dislocation or subluxation may be associated with a fracture of the articular surfaces or of the shaft of the bones, when it constitutes a major disaster; fracture dislocations of the spine or hip joint fall into this category and therefore do not come within the scope of this article.

Do subluxations or minor displacements described by the osteopath actually take place? The answer is that in certain joints minor displacements do occur, and often these can be demonstrated by good stereoscopic skiagrams or films taken in several planes. Those of the injured side should be compared with those of the normal. For instance, while running, if there should be an inversion adduction strain of the ankle joint at the moment the foot is firmly planted on the ground, the foot twists inwards but is fixed, and the body weight, transmitted through the lower end of the tibia, allows the tibia to slip forwards on the underlying talus, and a subluxation takes place (fig. 1). Owing to the shape of the articular surfaces the tibia is prevented from proceeding forwards to any great extent, as the upper articular surface of the talus broadens in front and prevents the tibial mortise from wandering farther in an anterior direction. Good comparative skiagrams of the two sides should show this forward minimal displacement of the tibia on the talus. Manipulative reduction by traction on the heel in a downward and forward direction at the same time as the tibia is pushed backwards on the talus must be carried out to restore full function.

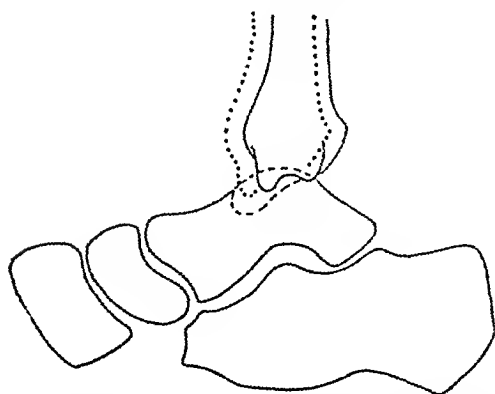


FIG. 1.—Ankle joint: continuous lines show normal position: interrupted lines show forward subluxation.

Often the position of subluxation is maintained by muscle spasm, followed later by the formation of granulation tissue due to the organization of traumatic effusion at the site of the injury.

When a spinal joint is inflamed by injury or infection, the surrounding muscles go into marked spasm, with the result that the spine is pulled out of its normal alignment. Recently it has been realized that in a prolapse of an intervertebral disc the surrounding muscles also go into spasm as a protective phenomenon. As a result of muscular spasm in prolapse of an interverte-

bral disc, the patient assumes an asymmetric posture, and this accounts for the position of marked tilting of the pelvis, sciatic scoliosis and some types of torticollis. Osteopaths, bone setters and chiropractors persist in claiming displacements of the vertebral joints in these conditions, and claim to "put back" by manipulation the dislocations or subluxations. What in fact happens by manipulation is the release of muscle spasm and the restoration of the normal range of movements to the various parts of the spine. Persistent muscle spasm may lead to adhesion formation, and manipulations free these adhesions and allow for normal movements. Confirmatory skiagrams will show that the position of the vertebræ are relatively the same before and after manipulation.

Subluxations can occur, however, in the sacro-iliac joints by forward or backward rotatory strains, as proved by physical signs—swelling and tenderness of the tissues over the joint, and increase in depth of the ridge between the posterior surfaces of the sacrum and ilium. Skiagrams often confirm the subluxation.

Sometimes an injury will cause a momentary dislocation or subluxation, and the articular surfaces are quickly restored to normal. In these cases it must be assumed that the force is not sufficiently violent to cause gross damage to the capsule and ligaments, so that reduction takes place on the recoil. Even so, the joint will probably show all the signs and symptoms of a sprain. The ligaments and capsule have been stretched, so that, unless care is taken to allow for recovery, the joint is left loose with hypermobility and a tendency to momentary dislocation or subluxation.

DIAGNOSIS

A detailed examination, which includes an accurate account of the history of injury, must be undertaken. For example, in a dislocated shoulder it is important to know whether it was caused by a fall on the forearm or elbow, with the arm in an abducted position, or by a blow on the back of the upper arm while in an abducted externally rotated position. The second type of injury often accounts for a fracture of the glenoid rim or a stripping up of the capsule attached to the glenoid rim, and it is in this type that recurrent dislocation of the shoulder occurs (fig. 2) (Watson Jones, 1944).

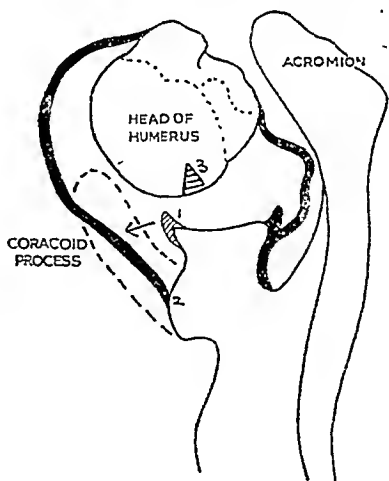


FIG. 2.—Recurrent dislocation of the shoulder. (1) Shows anterior part of glenoid rim detached. (2) Stripping up of capsular attachment from glenoid rim to a new position at 2. (3) Furrow in postero-superior aspect of head of humerus caused by impaction on glenoid rim.

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Do subluxations or minor displacements described by the osteopath actually take place? The answer is that in certain joints minor displacements do occur, and often these can be demonstrated by good stereoscopic skiagrams or films taken in several planes. Those of the injured side should be compared with those of the normal. For instance, while running, if there should be an inversion adduction strain of the ankle joint at the moment the foot is firmly planted on the ground, the foot twists inwards but is fixed, and the body weight, transmitted through the lower end of the tibia, allows the tibia to slip forwards on the underlying talus, and a subluxation takes place (fig. 1). Owing to the shape of the articular surfaces the tibia is prevented from proceeding forwards to any great extent, as the upper articular surface of the talus broadens in front and prevents the tibial mortise from wandering farther in an anterior direction. Good comparative skiagrams of the two sides should show this forward minimal displacement of the tibia on the talus. Manipulative reduction by traction on the heel in a downward and forward direction at the same time as the tibia is pushed backwards on the talus must be carried out to restore full function.

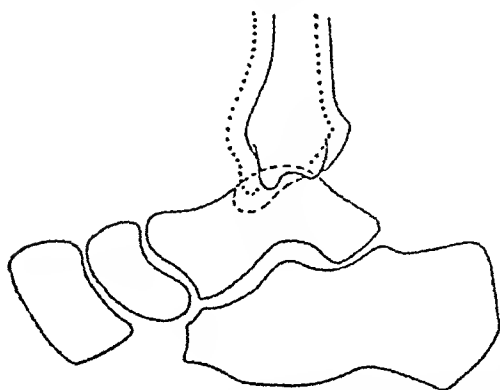


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When a spinal joint is inflamed by injury or infection, the surrounding muscles go into marked spasm, with the result that the spine is pulled out of its normal alignment. Recently it has been realized that in a prolapse of an intervertebral disc the surrounding muscles also go into spasm as a protective phenomenon. As a result of muscular spasm in prolapse of an interverte-

Naturally, before manipulative treatment is started, further radiological examination should be carried out, to exclude calcification occurring in the capsule ligaments or the presence of myositis ossificans.

In the treatment of injuries to joints, a careful distinction should be made between isometric and isotonic movements. The muscles controlling the joint, badly stretched and strained by the injury, are subjected to contraction without alteration in the relative position of their origin and insertion, and therefore the joint is rested. For example, if the wrist joint is held fixed in a moulded plaster of Paris cast, which extends to the metacarpophalangeal joints dorsally and to the first crease of the palm, and movements of the forearm muscles are instituted, the dorsiflexors and palmar flexors of the wrist joint move isometrically, i.e., the points of their origin and insertion do not alter owing to their fixed position in plaster of Paris. Consequently, in contracting, their muscle fibres broaden, whereas the extensors and flexors of the fingers move isotonicly, i.e., the muscle tone is constant, but there is alternative lengthening and shortening of one group of muscles according to whether the fingers are extended or flexed. Thus, when a sprained wrist joint is included in a well-moulded plaster of Paris cast, the muscles controlling this joint are contracted isometrically and there is no movement of the joint surface, but the other overlying tendons, which are flexors and extensors of the fingers, are moved isotonicly. The joints are remarkably free on removal of the plaster of Paris, provided these movements have been conscientiously carried out for a few minutes every hour during the day, as by so doing they have prevented the formation of joint adhesions.

In some cases there is so much traumatic effusion present that every endeavour should be made to disperse this as soon as possible. Excess traumatic effusion may lead to:—(1) Loose joint; (2) chronic synovitis and capsulitis; (3) marked muscle wasting; and (4) adhesion formation with stiffness.

Procedures to disperse traumatic effusion quickly, include:—(1) Aspiration of synovitis or localized hæmatoma; (2) small incisions through the deep fascia and expressing the effusion; (3) spraying the joint with ethyl chloride followed by effleurage, ionization and faradism; (4) contrast baths, hot and cold water baths alternatively, one minute each for ten minutes; (5) anti-phlogistine or kaolin at night.

In order to allow for the above, modified support is given in the form of a firm crêpe bandage over orthopædic felt or gamgee.

SPECIAL JOINTS

DISLOCATION OF INTERPHALANGEAL JOINT

Distal phalanx dislocates anteriorly, laterally or posteriorly, according to direction of causative force.

Reduction by traction and countertraction.

Skiagrams to exclude fractures.

If stable, treat to reduce traumatic effusion by contrast baths, effleurage, ionization,

Physical signs and symptoms of dislocation may include any of the following:—Pain, swelling, deformity, loss of function, evidence of circulatory damage, or injury to the nerves, either motor or sensory. In treatment it is necessary to establish whether the capsule or ligaments have been torn or ruptured; if so, healing of these, with the joint in plaster of Paris, must be instituted, otherwise a weak, unstable joint arises. Also, as the result of injury, there is usually a considerable amount of traumatic effusion present, and if this is not quickly absorbed its organization may lead to adhesion formation, muscle wasting and loss of joint movement.

In considering the movements in a joint, it is important to realize that each individual joint possesses a range of movement out of the patient's control, as well as its normal range of active movement. It is imperative to restore this range of involuntary movement, to ensure full recovery of active movement. These movements are called involuntary, but are essential in allowing free gliding between the joint surfaces. They include movement of one bone on another in antero-posterior, postero-anterior, lateral and rotatory directions.

TREATMENT

In the treatment of minor dislocations and subluxations, the following procedures should be adopted:—

(1) The joint surfaces must be restored to normal by manipulation. Careful reduction is essential, as so much damage of the tissues can be caused by a rough or careless manipulation. If a dislocation or subluxation has recently taken place, it is often possible to reduce it without the use of an anæsthetic. Later, when the muscle spasm has set in, it is kinder to give a full anæsthetic, although often with care and time it is possible to perform the reduction without undue pain. Traction and countertraction are essential; in making this the hands are gently placed with one below and one above the dislocated or subluxed joint. The firmness of the grip is gradually increased and with the resulting traction, the articular surfaces are drawn apart and the dislocated bone made to retrace the track it took in dislocating. If the reduction can be performed with such care that there is no thud or snap, little additional trauma will be added. Rough reduction is often a contributory cause of calcification in the lateral ligaments, or of myositis ossificans in elbow joint dislocations.

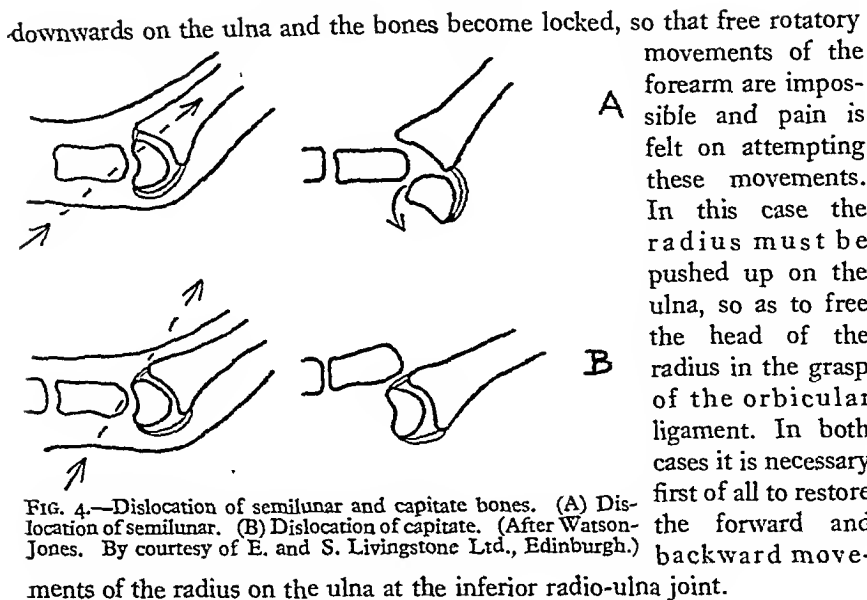
(2) Skiagrams in several planes must be taken before and after reduction, to ensure that there is no fracture or separation of bone and that accurate reduction has taken place.

(3) If there is tearing of the capsule or ligament, accurate reduction must be held in a well-moulded plaster of Paris cast until these are healed. Often, in the case of a fracture, it is necessary to include the joints above and below the site of fracture, but in a dislocation it is only necessary to support the joint itself. Faradism can be given to the muscles by cutting windows in the plaster of Paris cast, and swelling is prevented by packing in orthopædic felt and bandaging firmly when the windows are not in use.

(4) Damage to the circulation or nerve must be excluded at first examination and after manipulative reduction.

(5) Wasting of the muscles controlling the joint must be prevented by active movements in plaster of Paris, aided by faradic stimulation of these muscles.

(6) When healing has taken place and the plaster of Paris has been removed, both the voluntary and involuntary range of movements must be restored to full range by active use and physiotherapy, which may need to include manipulation with or without an anæsthetic.



TENNIS ELBOW

The patient complains of pain on picking up articles, sometimes even a cup of tea; this symptom is more pronounced with the forearm in pronation than supination. Pain may be referred to the wrist joint, but it is always felt in the elbow joint on the outer side over the head of the radius. From a practical point of view with regard to treatment, two main types exist. Skiagrams should be taken to exclude periostitis of the external condyle.

The first type is produced in a young healthy individual making a sudden backhand shot at tennis, and it is considered that a tear of the extensor carpi radialis brevis has taken place. Recent cases require support, massage, faradism and graduated exercises and rest from strain. Cases seen after one month respond immediately to manipulation, massage, faradism and exercises, after one, two or three treatments.

The second type comes on insidiously in an older patient and may be the result of prolonged tennis playing, digging in a garden, wringing out clothes, working a pneumatic drill, casting a fly, or any exercise causing undue strain on the extensor origin. Often it is found that there is a septic focus present, and it must be assumed that there is a rheumatic factor in the condition because this type does not recover rapidly. Manipulations, injections, deep massage, ionization, diathermy and operations have all been claimed to cure the condition.

The tender area extends over the origin of the extensors from the external condyle and spreads over the radio-humeral collateral ligament and round the head of the radius, following the outline of the orbicular ligament. Apart from a strain of the extensor origin and radio-humeral collateral ligament

and faradic stimulation of long flexors and extensors, as well as lumbricals and intrinsic. Protection and support by felt pad and firm bandage.

If unstable, same with active treatment for five days, then plaster of Paris for two weeks with active treatment.

By ordinary methods a thick painful joint persists for months; by above treatment a stable joint is normal in one week, an unstable joint in four weeks.

METACARPO-PHALANGEAL JOINT OF THUMB

Proximal end of first phalanx backwards, head of first metacarpal through hole in capsule (fig. 3A).

Reduction by traction, counter-traction and pressure to retrace steps of dislocation.

Reduction may be impossible owing to interposition of flexor brevis with sesamoids and the tendon of flexor pollicis longus (fig. 3B). This may necessitate open reduction.

After-treatment as indicated in interphalangeal joint.

DISLOCATION OF SEMILUNAR

Due to fall on outstretched hand, semilunar becomes squeezed forwards and rotates (fig. 4A).

Reduction by traction, counter-traction and pressure (Watson Jones, 1944).

Skiagrams to control reduction.

Plaster of Paris for two weeks, with exercises and daily faradism, followed by felt and crêpe bandage support and further physiotherapy.

Late cases.—Attempts at reduction usually fail and operative removal is necessary.

If removal is followed by faradism, exercises, ionization, contrast baths and massage after two weeks, excellent results are obtained in two months.

(Injury to median nerve and motor supply of muscles of thenar eminence may occur as result of dislocation or rough reduction.)

DISLOCATION OF CAPITATE

Fall on outstretched hand causes backward displacement of capitate. Reduce.

Plaster of Paris for two weeks with active treatment, followed by felt and crêpe bandage support with further active treatment (fig. 4B).

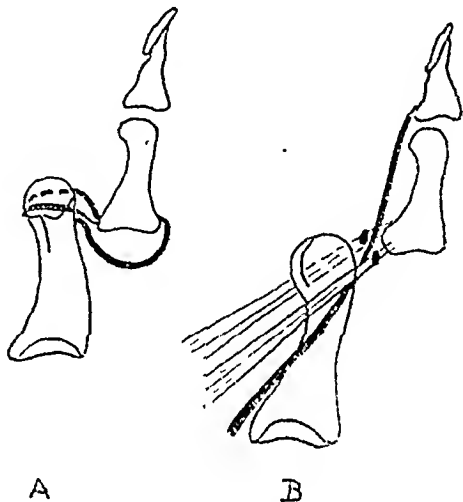


FIG. 3.—Dislocation of metacarpophalangeal joint of the thumb. (A) Ordinary dislocation; head of metacarpal through hole in the capsule. (B) Dislocation with interposition of sesamoid bones with flexor brevis pollicis and flexor longus pollicis.

PULLED AND PUSHED ELBOW

Mennell (1945) has shown that there is considerable play of the radius on the ulna in upward and downward directions between the extremes of pronation and supination. In these extremes the interosseous ligament and the ligaments of the inferior radio-ulnar joint are taut. A fall on the hand, with the elbow bent, may push the radius up on the ulna, the ligaments tighten and hold this position, and, until the radius is pulled downwards by traction, pain and limitation of movement may be felt in the elbow and wrist joints. Also, a wrenching force on the hand may pull the radius

scheme of treatment these conditions are less likely to occur:—

- (1) Careful reduction.
- (2) Evacuation of hæmatoma, if excessive.
- (3) Support with wool bandage and a sling.
- (4) Contrast bath three times daily for a week.
- (5) At the end of three days the patient is allowed to carry out gentle active movements twice daily to the point of pain. The joint is put through the range of each possible movement four times at each session and increasing by two times each day. Massage and passive movement are forbidden.
- (6) If available, ionization or diathermy with gentle graduated muscular contraction are started on the tenth day.

By this method uncomplicated dislocations should have full range of active movements in one month. At the end of six weeks, before allowing active movement with strain, further skiagrams are taken to exclude the formation of myositis ossificans or calcification.

DISLOCATION OF SHOULDER JOINT

A careful history should indicate whether or not the dislocation is likely to develop into one of the recurrent type.

Some injury, whether a contusion or fracture, often occurs to the greater tuberosity. In the ordinary type (fig. 7), treatment includes:—

- (1) Reduction by Kocher's method.
- (2) Support of the humeral head by wool or gamgee in the axilla held by elastoplast firmly encircling the axilla, outer end of the clavicle and acromion, and a sling for three weeks.
- (3) Faradic contractions are given daily with assisted movements starting on the third day. Full range of movements should be possible in three weeks, and after this full tone and power in the muscles are aimed at by graduated active exercises and further faradism.

If recurrent dislocation is likely to occur the previous treatment is modified as follows:—

- (1) Orthopædic felt is placed in the axilla and encircles the joint front and back.
- (2) Pressure on the glenoid rim is maintained by firmly applied elastoplast.
- (3) The arm above the elbow is strapped to the chest and the humerus held up in the axilla by elastoplast encircling the point of the elbow, the outer end of the clavicle and the acromion.
- (4) The support is reinforced or renewed every fourth day.
- (5) Tone in the deltoid, supraspinatus, infraspinatus and other muscles is maintained by faradism and gentle active contraction of the muscles against the resistance of the strapping.

After four weeks a sling is allowed and full range of movements obtained by further faradism and graduated exercises. Use of the shoulder for violent exercise should not be allowed until full movement of the joint and power in the muscles have returned, which should be in three months.

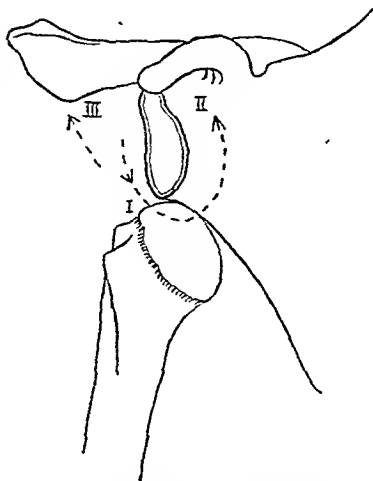


FIG. 7.—Ordinary dislocation of shoulder showing three possible positions. (1) Subglenoid. (2) Sub-acromial. (3) Posterior or subspinosus.

there would appear to be a capsulitis of the radio-humeral joint. Treatment consists of:—

(1) Excluding septic foci.

(2) Local injections of 1 c.cm. of 2 per cent. novocain into different parts of the tender areas at weekly intervals. It is a mistake to inject more than 1 c.cm. at a time, as there may be a violent reaction with great pain for several days. Using 1 c.cm. I have not had an undue reaction. Alternatively, spraying tender area with ethyl chloride until frosting occurs and rubbing with petroleum jelly makes the area temporarily insensitive so that manipulation can be carried out.

(3) Manipulation of joint, especially adduction or varus forcing of the extended elbow. A crack is often felt.

(4) Deep massage across the fibres of the extensor origin. Often the area becomes extremely tender, but movements become gradually freer, and as improvement occurs the tenderness passes off.

(5) Ionization and faradic stimulation of the extensors.

(6) Remedial exercises, contrast baths, and antiphlogistine at night.

DISLOCATION OF ELBOW JOINT

Careful examination of skiagrams before and after reduction will often reveal minute flakes of bone pulled from the condyles. These are placed just below the flexor and extensor origins from the internal and external condyles. In one case with excessive effusion I made small ($\frac{1}{2}$ cm.) incisions over the front on the medial side and over the back of the joint on the external side, and expressed a great quantity of blood; to my surprise, a small piece of bone with muscle attached came out of the inner incision (fig. 5).

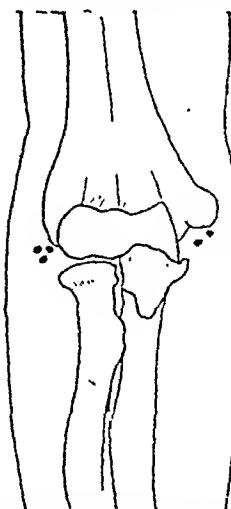


FIG. 5.—Dislocation of elbow. Position of flakes of bone near origin of the muscles seen after reduction.

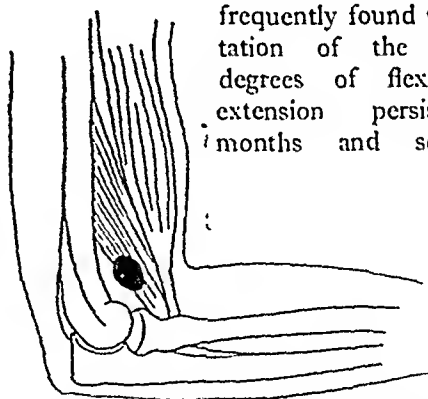


FIG. 6.—Elbow joint. Position of myositis ossificans in the tendon of brachialis anticus.

After dislocation it is frequently found that limitation of the terminal degrees of flexion and extension persists for months and sometimes

normal function never returns. It is said that limitation of the last degrees of extension does not matter, but for a soldier or labourer this often leads to pain and difficulty in performing full duties.

There is some danger of calcification or myositis ossificans occurring in the lateral ligaments or brachialis anticus (fig. 6), but with the following

- (1) Support in the form of felt and a crêpe bandage or elastic webbing.
- (2) Heat and gentle faradism.
- (3) Gentle manipulation to coax out muscle spasm and restore full movement of the spine.

Rheumatic torticollis in flexion and side-bending, or lumbago with a sciatic scoliosis, is often associated with brachial and sciatic neuritis and is probably due to a disc injury: it should be treated by rest, immobilization in plaster of Paris, or surgery, after manipulation has failed. Sometimes a manipulation after epidural infiltration is thought to replace the injured disc or prolapse, and should be tried, but the patient should be warned that its failure may necessitate a period of absolute rest. The benefit often accruing from spinal manipulation only does so by overcoming muscle spasm, breaking down adhesions, restoring full movements and adjusting muscle balance.

SUBLUXATION OF SACRO-ILIAC JOINTS

Anterior rotatory strains are reduced by manipulation producing a posterior rotatory force on the joint, whereas posterior rotatory strains require a force in an anterior direction. Following this, the joint should be rested for two weeks, and the patient on resuming the erect position may have to be given support in the form of a corset. Tenderness over the joint and in the surrounding muscles is dissipated by heat, massage and faradism.

SUBLUXATION OF THE KNEE JOINT

Forward and backward movement of the tibia on the femur depend upon the integrity of the anterior and posterior cruciate ligaments. If the anterior cruciate ligament is stretched or ruptured, the tibia can be pulled forwards on the femur with the knee flexed, and when the posterior cruciate ligament is damaged, it can be pushed backwards. Stability of the joint depends upon satisfactory healing of these ligaments and retention of tone and power in the quadriceps. If the injury has produced a large synovitis this should be aspirated and the knee joint placed in a well-moulded plaster of Paris cast from mid-thigh to 4 inches above the ankle joint. Quadricep exercises are given from the beginning, and personally I cut windows in the cast over the patella and vastus internus muscle. In this way the patella can move up and down and from side to side daily, and the tone of the quadriceps be maintained by daily faradism.

Many authorities are of the opinion that, provided the patient carries out regular graduated exercises, faradism is unnecessary. I can only state from personal experience that with exercises alone many patients have failed to recover full function, owing to persistent instability of the joint. Many of these have obtained full function after a course of exercises combined with faradism given daily for half an hour, six days a week for six weeks. After removal of the cast at the end of eight weeks, in cases of lax or ruptured cruciate ligament, the joint will be found stiff, but if treated as advised on page 244, this passes off in a month, so that at the end of three months from the date of injury, there should be full function.

ACROMIO-CLAVICULAR DISLOCATIONS

Treatment depends upon the degree to which the trapezoid and conoid ligaments have been stretched. Patients in whom momentary dislocations occur and these ligaments remain intact, should be treated by support in a sling for a week, massage and faradism, assisted by shoulder and acromio-clavicular movements. On several occasions I have been able to aspirate blood-stained serum, which has seeped to the surface after five to ten days. Full function should be obtained in two weeks.

When the ligaments have been stretched and subluxation persists, treatment should be in the form of firm strapping over felt, with faradism to the shoulder muscles. The strapping should encircle the outer end of the clavicle and the point of the elbow and will have to be renewed frequently. It should be retained for four weeks, and deep friction massage over the joint should be given, with faradism to the surrounding muscles. Complete recovery takes place only when there are full shoulder and acromio-clavicular movements without pain or any tenderness of the joint; but recovery should be complete in six weeks.

Cases in which the trapezoid and conoid ligaments are stretched or ruptured, so as to allow gross subluxation or dislocation, require surgical intervention by insertion of a screw as described by Vere-Hodge (1944).

DISLOCATION OF THE SPINAL JOINTS

The present knowledge of prolapse of the intervertebral disc has changed the conception of such conditions as rheumatic torticollis, lumbago, and sciatic scoliosis. Many authorities (Crisp, 1945; Cyriax, 1945) consider that these conditions occur as the result of injury to the annulus fibrosus, which they liken to the tear of a meniscus of the knee, causing locking of that joint, or to a prolapse of a disc after degeneration of the annulus.

Haboush (1942) carried out experiments on post-mortem specimens of the lumbar spine, producing flexion strains of varying severity. He found that according to the severity the following structures were damaged in this order:—(1) The intertransverse ligament and lumbo-dorsal fascia between lumbar 4 and 5; (2) most lateral fibres of the anterior and posterior longitudinal ligaments, the articular capsules, the ligamentum flavum; (3) separation of the neural arch with involvement of the annulus fibrosus and nucleus pulposus. It can be seen that injury to the annulus fibrosus and prolapse of the nucleus pulposus do not occur unless the force is considerable.

O'Connell (1946), describing prolapse of discs in the lumbar region, stresses that all such patients have an obliteration of the lumbar curve and sciatic scoliosis.

It has long been known that the lumbago with an accentuated lumbar lordosis recovers quickly, as does a rheumatic torticollis in extension, in distinction to the lumbago and rheumatic torticollis in flexion and side-bending, in which the prognosis is poor. Rheumatic torticollis and lumbago with exaggerated extension always respond in a few days to the following treatment:—

- (1) Support in the form of felt and a crêpe bandage or elastic webbing.
- (2) Heat and gentle faradism.
- (3) Gentle manipulation to coax out muscle spasm and restore full movement of the spine.

Rheumatic torticollis in flexion and side-bending, or lumbago with a sciatic scoliosis, is often associated with brachial and sciatic neuritis and is probably due to a disc injury: it should be treated by rest, immobilization in plaster of Paris, or surgery, after manipulation has failed. Sometimes a manipulation after epidural infiltration is thought to replace the injured disc or prolapse, and should be tried, but the patient should be warned that its failure may necessitate a period of absolute rest. The benefit often accruing from spinal manipulation only does so by overcoming muscle spasm, breaking down adhesions, restoring full movements and adjusting muscle balance.

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SUBLUXATION OF THE ANKLE JOINT

Adduction-inversion strains of the ankle, apart from damaging the

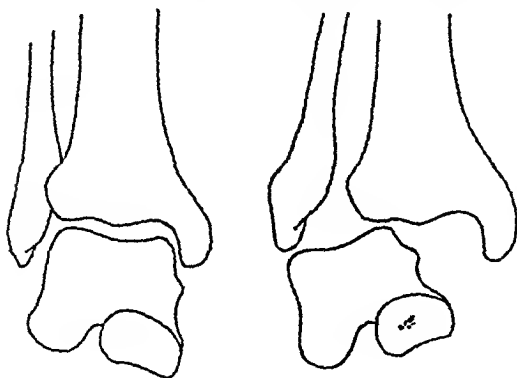


FIG. 8.—Ankle joint. (A) Normal position. (B) Tilting of the talus owing to rupture of the external lateral ligament and diastasis of the inferior tibio-fibular joint.

anterior fibres of the external lateral ligament, often result in forward subluxation of the tibia on the talus. This must be reduced as described on page 244 and the concomitant sprain of the joint treated. If the force is greater, rupture of the external lateral ligament occurs, and this will allow outward tilting of the talus (fig. 8).

Skiagrams should be taken with the patient under pentothal anaesthesia, and with the foot forcibly inverted, to confirm outward tilting of the talus and diastasis of the inferior tibio-fibular joint; if present the ankle joint must be placed in a well-moulded cast for six weeks, and in order to maintain muscle tone I cut windows to allow for faradism (fig. 9). Weight bearing in the cast is not allowed for three weeks, when the cast is renewed, as the original cast is bound to be slack owing to subsidence of the swelling. After removal of the cast and on resuming walking, in cases which have shown outward tilting of the talus, a useful tip is to advise the patient to have the heel of his shoe broadened $\frac{3}{4}$ inch and the tread $\frac{1}{2}$ inch on the outer side. This helps to prevent ricking over of the ankle when walking on rough ground, by bringing the centre of gravity of weight bearing to the inner side of the heel.

Two conditions (Tucker, 1935) causing pain and loss of function often occur following ankle subluxations. The first and most common gives rise to swelling and tenderness of the structures in relation to the spring ligament and tendon of tibialis posticus on the

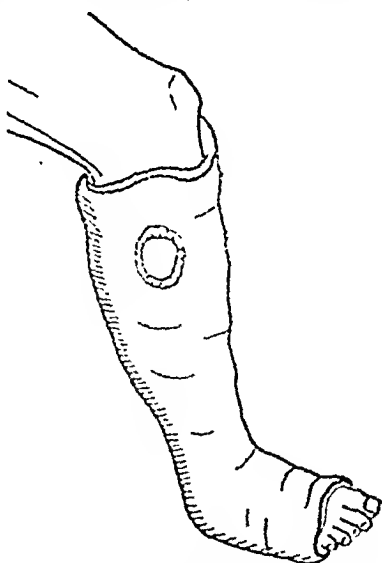


FIG. 9.—Plaster of Paris with window, through which the anterior tibial group of muscles can be stimulated by faradism. Similar window is cut on the back of the calf to stimulate the invertors and plantar flexors.

infero-medial surface of the tarsal

scaphoid. It is not present in the early stages, but develops ten days after the injury. It is partly due to a tendency to foot strain and the adoption of a valgus position of the foot after injury. At the time of the inversion-adduction injury, the head of the talus is forced down on to the deep surface of this ligament and tendon, and a contusion of these structures takes place. Bruising takes several days to seep from this surface and does not appear for ten days. Treatment by massage and faradism promotes a quick recovery.

The second type gives rise to persistent pain at the back of the ankle, when the forefoot is forcibly abducted, as in kicking a football. This is due to a strain of the posterior fibres of the external lateral ligament and is only cured by forcibly abducting the forefoot and at the same time forcibly adducting the hind foot with the patient under pentothal anaesthesia, thus stretching the posterior band of the external lateral ligament and restoring its normal length.

Many cases of local pain and loss of movement are due to muscle spasm resulting from primary muscle strain or simple muscle cramp. Many of these are relieved by manipulative stretching, which reduces the spasm and restores normal muscle balance.

SUMMARY

- (1) A detailed history of the injury should be taken.
- (2) Skiagrams should be taken before and after reduction. In certain joints before active use with strain is allowed, further films are taken to exclude excessive formation of bone.
- (3) Complications, such as nerve or circulatory damage, must be excluded.
- (4) Treatment includes careful reduction; support to the joint for varying periods of time according to severity of damage and whether the joint is weight-bearing; dispersing traumatic effusion; restoration of full range of involuntary and voluntary movements as well as muscle power and balance.

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MINOR INJURIES OF THE HAND

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MINOR injuries of the hand are responsible for more suffering and for more economic loss than is the sum of all the other human injuries that occur in industry. This suffering and this loss are largely due to inadequate treatment and are therefore preventable.

In one of the Royal Ordnance factories employing approximately ten thousand workers, the figures for one year showed a total of 13,300 accidents, by far the greater majority of which were minor injuries to the hand. During that year not one single case of sepsis occurred and only ninety-eight working days were lost as a result of injury. A highly trained team of industrial medical officers and nurses, employing the highest standard of surgical technique, was necessary to procure this remarkable result, but their work has demonstrated that the treatment of every minor injury to the hand should be considered as a major surgical undertaking.

In this article the principles of treatment will be discussed rather than set methods, as these latter must vary from time to time with the development of new drugs, dressings and appliances.

GENERAL PRINCIPLES OF TREATMENT

The first aim of treatment is the restoration of function. The functions of the hand are broadly classified into handling, fingering and feeling. *Handling* includes the various types of grip or grasp in which the palm takes an effective part. *Fingering* includes the "pincer" and "pliers" types of grip obtained between a finger and the opposed thumb, and also those movements which require digital dexterity, such as typewriting. *Feeling* is the appreciation of touch, temperature, and such-like.



FIG. 1.—Cylinder grip showing inhibition of the ball grip.



FIG. 2.—The ball grip with the thumb opposed.

Loss of function in the hand is due as much to loss of muscle coordination as to the more usually recognized causes of pain and stiffness. I have shown (*Lancet*, 1943, 1, 729) that one effect of injury to a hand is to cause loss of dexterity by inhibiting the acquired reflexes, and when inhibition of a reflex occurs, muscle incoordination follows. After recent injury to a hand there is inhibition of the acquired ball-grip reflex with substitution of the primitive cylinder grip of the new-born baby. If the patient is asked to close his hand, he will flex the fingers into the palm, but keep the thumb extended and often firmly abducted (fig. 1 and 2). This is due to inhibition of that flexion and opposition of the thumb found in the ball grip. The resultant grip is feeble, dexterity is lost and there is a tendency for the rapid development of muscle incoordination, all of which retard recovery by encouraging stiffness and diminishing blood supply.

The first principle of the treatment of the injured hand should be to restore the ball grip and thus, as it were, to bring the hand back to the same psychological plane as it occupied before the accident. This is done quite simply by demonstration, showing the patient that he can bring the thumb to the apposed position. Usually the quickest results are obtained by making the patient hold both hands out in front of him in the pronate position, and telling him to look at the "sound" hand and close both hands together. If the hands are held in the supine position there is a tendency to palmar flexion of the wrist, with consequent weakness of the grip and loss of that sensation of power that is obtained with the wrist dorsiflexed.

Having established in the patient's mind the right method of coordinate movement of the hand, it is essential that the maximum permissible range of movement should be preserved throughout treatment. In order to encourage such movement, dressings must be selected to ensure freedom from the fear of pain, and also to permit, so far as possible, normal usage of the hand. For example, when an individual digit is involved, the dressing must be streamlined to allow movement of the neighbouring digits. Although a special article is devoted to the subject of dressings, the choice of individual dressing in hand and finger injuries is so important that it is necessary here to add a few paragraphs on the principles of selection.

DRESSINGS for the injured hand should (1) afford *protection* against infection, trauma and contamination; (2) promote *absorption* of discharge; (3) permit *evaporation* of sweat; (4) encourage *movement* of the hand and arm. In addition to possessing these functions, the dressing should be neat in appearance, easily applied, comfortable, secure and durable. It should not stick to the wound or stitches, it should not be bulky or have loose or frayed ends, it should not be difficult to remove, it should not be easily inflammable, it should not retard healing and it should not stain the skin.

It will be appreciated from the above that no single material or single combination of dressing and covering will possess all these desirable properties. For example, the dressing that is fully protective against water

contamination is hardly likely to permit evaporation from the skin. It is sometimes necessary to change the dressings to meet varying conditions. In industry, many thousands of working hours are saved by this simple expedient. Men and women, whose wounds are liable to contamination by oil or water, visit the works' surgery before starting their shift, and have a waterproof outer dressing applied; this is replaced by a simple, but neat, cotton bandage when they leave work.

Application of dressings.—The first principle of the application of dressings is rigid asepsis, and to secure this a "no touch" technique must be employed. The immediate covering of the wound must be adequate but minimal in size; if a finger has a wound $\frac{3}{4}$ inch in length, a piece of gauze or tulle gras the size of a postage stamp is all that is required. If, as is so frequently seen, a piece of gauze 4 inches by 4 inches is wrapped around the finger with a good $\frac{1}{2}$ inch protruding beyond the end, the resultant dressing is both clumsy and insecure. Cotton-wool is seldom required in finger dressings, except when much discharge is present or when conditions of extreme tenderness demand a resilient buffer dressing.

Fixation of dressings.—(1) The cotton bandage is the most usual and, in some respects, the most unsatisfactory covering for the hand dressing. Its chief advantage is that it is flexible and that it allows evaporation. Its disadvantages are that it is relatively insecure, that it affords little protection from outside trauma and none from contamination by water or oil.

(2) For wounds of the fingers and thumb of moderate severity more protection is afforded to the part by the use of the plaster of Paris cot (fig. 3). This is easily made and easily renewed, and gives the patient confidence to use the hand because he is assured of freedom from pain that he might otherwise have from contacts with his tender digit. The disadvantages of the plaster cot are that it does not permit proper evaporation from the skin and therefore, if kept in position for too long, allows the finger to become sodden; it does not afford adequate protection against water and oil.



FIG. 3.—Vizad and plaster of Paris cots.

(3) A waterproof material must be used to secure complete protection from water or oil. The rubber finger cot is unsatisfactory because it is so easily damaged. A more durable material, "vizad", is an adhesive viscose

film, 0.003 mm. thick, and treated for liquid resistance. This, made up in the form of a narrow surgical strapping, is used to fashion streamlined cots which are quite firm and form adequate protection for tender wounds. Its two disadvantages are that it is not as easily moulded as plaster of Paris and that it does not permit any evaporation, so that it is not suitable for a permanent dressing, although suitable for temporary dressings during working hours.

Slings.—In the treatment of minor injuries to the hand, a sling should never be permitted after the first twenty-four hours, and during that time it should be adjusted so that the elbow is flexed through 120° , thus permitting good circulation of the hand but also preventing engorgement of the injured part. In all cases of hand injury, full movement of the shoulder and elbow must be demonstrated at least once a day. One of the most common causes of incapacity for work following hand injuries is stiffness of the shoulder joint; this is entirely due to neglect to maintain full movement during treatment.

BRUISING OF THE NAIL

This is the most painful and the most easily relieved of injuries to the hand.

The pain is due to hæmorrhage beneath the nail slowly separating the nail from its bed. The blood in the small resultant hæmatoma is under considerable pressure and, unless evacuated, will in most cases result in the nail being shed; but if the nail is trephined the blood escapes, there is immediate relief of pain and, in by far the greater majority of cases, the nail is saved. The technique of trephining the nail is quite simple:—

A minute hole is bored through the nail over the hæmatoma—this is a painless procedure, provided that pressure is not exerted on the instrument used—the finger is immersed in cetavlon or 1:1000 flavine for a few minutes and then the nail trephined with a straight surgical needle, which is rotated by rolling between the finger and thumb. As soon as penetration has been secured, blood will escape under such pressure that it may even reach the operator's face if he is bending over the wound. The point of the needle will not reach the nail bed, because at the site of the hæmatoma the nail has already been stripped. A sterile dressing is applied to the nail and secured with a strip of adhesive plaster which is maintained in position for a few hours.

No further treatment should be necessary. In cases in which the patient is fearful of immediate return to work, a plaster of Paris thimble worn for a day or two will give the required confidence.

CRUSH INJURIES TO THE TERMINAL PHALANGES

The pain in these injuries, which is always severe, is due almost entirely to the hæmatoma beneath the nail, and substantial relief is obtained immediately the nail is trephined. After trephining the nail the digit must be X-rayed and the extent of crushing of the terminal phalanx determined. Provided the base of the phalanx is intact, the only further treatment necessary is the application of a plaster of Paris cot which may be worn for

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from ten days to three weeks. If, as is usual, the nail is saved by trephining, it will act as an adequate splint, and plaster is unnecessary after ten days. Bony union in crush fractures of the terminal phalanges is not demonstrable by X-rays for some weeks, but the fragments are soon bound together by firm fibrous tissue and full function of the finger is obtained. After obtaining the initial film on the day of injury, further X-ray examination should be discouraged in uncomplicated cases. They are apt to lead to an anxiety state in the patient from the consciousness of an "ununited fracture". For the application of the plaster cot three thicknesses of plaster bandage are cut in the pattern shown (fig. 4), moistened with water, wrapped around the finger and gently moulded by the operator until the plaster is firmly set. This continuous moulding ensures rapid and close setting and a smooth finish to the cot. The lower free margin of the cot, which should extend to the proximal interphalangeal joint, may be smoothed with the handle of a scalpel. The cot, if applied over a thin layer of tulle gras, is easily removed.



FIG. 4.—Plaster slab being moulded on the injured thumb.

BURST FINGER

In those cases of crush injury in which the soft tissues are both bruised and lacerated, careful surgical toilet of the finger must be made before the application of the plaster cot. The initial immersion in antiseptic solution and trephining of the nail are carried out as in uncomplicated crushed fingers. The wound should be further sterilized by syringing with a suspension of sulphathiazole in 1:1000 flavine, the strength used being 1 gm. to 10 c.cm. It is convenient to have in the surgery a graduated test tube, the first graduation to mark 1 gm. of sulphathiazole powder and the second graduation the additional 10 c.cm. of 1:1000 flavine. The irrigation is done with a record syringe. By using the suspension of sulphathiazole the crystals are carried into the remote crevasses of the wound which would be inaccessible to a dusting powder. The wounds must never be excised. Every scrap of viable tissue must be preserved and then the most accurate apposition of the wound edges secured by multiple fine sutures. The wound is dressed with tulle gras and a plaster or vizad cot applied (fig. 5), but it is most important that the finger shall not be allowed to become soft, and it is generally necessary to substitute a cotton bandage for the cot for some hours during the twenty-four hour period.

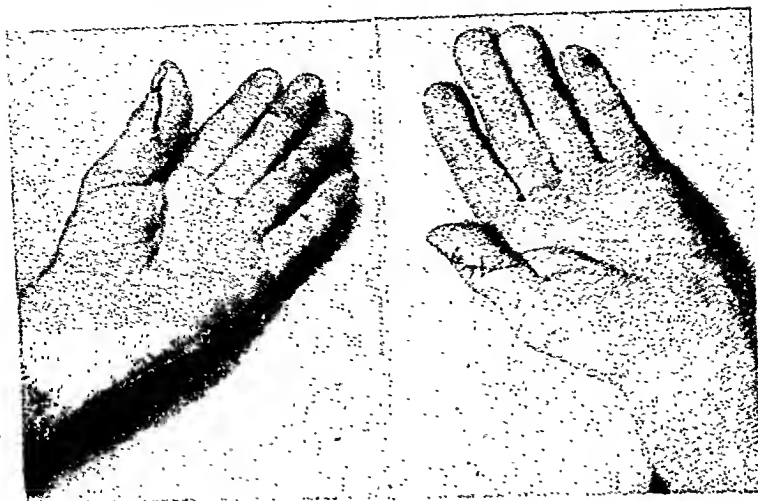


FIG. 5.—(a) Severe gash of left thumb. FIG. 5.—(b) Incision repaired by stitching after antiseptic treatment.

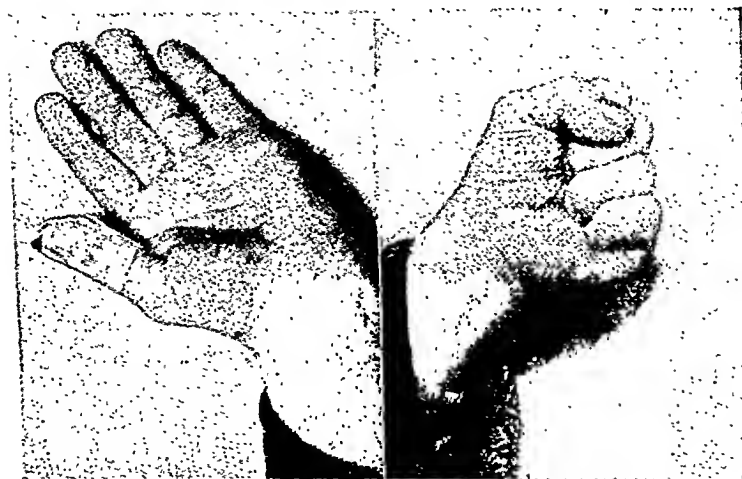


FIG. 5.—(c) Streamlined vizard finger cot covers injury, affording adequate protection whilst at work. FIG. 5.—(d) Seventeen days later: incision completely healed: full power in grip. Not one day's work lost.

(From *British Machine Tool Engineering*, 1944, 26, 121).

HAMMER FINGER

This deformity is the result of detachment of the extensor tendon from the base of the terminal phalanx. It may be due to a wound dividing the tendon at its attachment, in which case it should be treated by immediate suture and fixation of the terminal joint in hyperextension. Not infrequently, the tendon is avulsed with a minute portion of the base of the phalanx. These cases do well if immediately and securely immobilized in hyper-

extension with a plaster cot. The method of application of the cot is shown in fig. 6 and 7:—A strip of plaster bandage is used to draw the end of the



FIG. 6.—Hyperextension of the terminal interphalangeal joint with plaster slab

FIG. 7.—Completed plaster cot for hammer finger.

finger backwards, then plaster is moulded round the finger in the usual way. The pad of the finger is so vascular that there is no fear of pressure necrosis when this technique is applied.

It is often difficult to secure proper hyperextension of the joint with other methods of application of plaster. Hyperextension of the finger should be maintained for three weeks and the plaster cot worn at night for another six weeks. The patient should be warned that for a time a small lump will persist on the back of the finger.

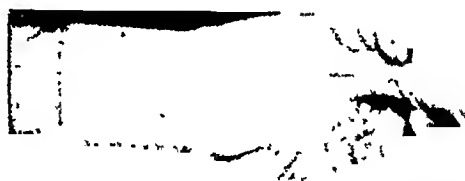


FIG. 8.—Fractured phalanx. Wire and plaster splint

FRACTURES OF THE BASAL AND SECOND PHALANXES

If the fractures are open and uncomplicated by tendon injury, the wound should be treated as described under burst finger and the fractures subsequently treated as closed ones. When deformity occurs in fractures of these phalanges, it is invariably due to palmar angulation. Reduction of the deformity is secured by flexion of the finger with or without extension. All fractures of the phalanges must therefore be treated in semi-flexion.

A narrow wire splint, moulded to the shape of the palm and the semi-flexed injured finger, is fixed in position with a plaster of Paris forearm-cuff, a strip of felt being used to protect the finger from contact with the wire (fig. 8). After reduction of the fracture by manual traction the finger is secured to the splint with a plaster of Paris bandage. If there is any tendency to recurrence of the deformity, extension is applied by means of a pin fixed through the skin at the end of the finger. The pull on the pin is maintained by a tape tied to the end of the splint. In those cases

in which extension is likely to be required, the splint should extend for 2 inches beyond the extremity of the finger; in other cases it extends only to the end of the finger. Immobilization should be maintained for three weeks, but during this period it is essential that the remaining digits be vigorously exercised.

AMPUTATIONS OF DIGITS

The amputation of a portion of a finger is a disaster; the amputation of a portion of the thumb is a major disaster. For this reason, primary amputation of a finger after injury is only justified if it is beyond all doubt that the distal portion of the digit is not viable. When a portion of the finger must be lost, every effort should be made to retain the maximum length of stump; length should never be sacrificed so that skin flaps may be easily fashioned—in such cases denuded areas should be covered by skin grafts. As an example of the necessity for preserving length in the amputated stump, the function of the little finger may be considered. In the manual worker the breadth of the palm of the hand is of great importance in securing leverage in the use of spanners, heavy hammers, and such-like. The little finger hooked round the handle of the tool enables the whole breadth of the palm to be brought into play, but with loss of the major portion of this finger there is considerable loss of the power of leverage. For a similar reason removal of the head of a metacarpal bone for alleged cosmetic reasons is inexcusable. It results in a weakening of the power of handling by not less than 10 per cent. and sometimes as much as 30 per cent. In certain special cases removal of the head of the second metacarpal bone is permissible, but this is only in hands requiring a considerable amount of digital dexterity, and in the majority of these cases the disadvantages outweigh the advantages.

Every amputation of a finger should be undertaken with all the preliminary preparation and subsequent care of a major surgical operation. The operation should never be hurried, and therefore the choice of anæsthetic must permit of ample time. In the majority of cases of amputation for trauma the necessity for preserving length of stump dictates the fashion of the flaps, but in set operations a posterior racquet or long palmar flap should be used so that the resultant scar is brought on to the dorsum of the stump. The digital nerves should be sought, pulled down slightly, and then divided so that they retract beyond the suture line; they should not be ligatured. The tendons should not be sutured over the end of the bone; this always results in a somewhat painful stump. After amputation, minimal dressings must be applied and full movement of the remaining fingers insisted upon from the first day.

Painful nerve endings.—Painful nerve endings following amputations are invariably associated with an anxiety state and, for this reason, no surgical intervention will benefit the patient until the anxiety state is relieved. Injection of the digital nerves with alcohol, resection of nerve endings or re-amputation will be followed at a short interval by a return of symptoms with increased severity, whereas recovery will take place without surgical treatment in those cases in which the cause of the neurosis, whether it be the weekly payment of compensation or anxiety associated with litigation, is removed. The wearing of finger stalls over the painful stump prolongs the disability and should be discouraged.

INJURIES TO TENDONS

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INJURIES to tendons may be classified under two headings:—(a) Closed or subcutaneous injury or rupture; (b) division in open wounds.

SUBCUTANEOUS INJURY

The most simple forms of subcutaneous injury are contusions and sprains. All tendons are liable to be involved, with other structures, such as ligaments and fascia. Such injuries are due to falls, violent exercise or blows, and tend to occur more frequently after a period of inactivity. Diagnosis is obvious and treatment calls for no special comment. Of much greater importance are those injuries in which the tendon is ruptured or torn from its insertion. Pain is intense, acute and localized, and the patient may fall to the ground. A gap is produced by retraction of the muscle belly and there is loss of function when the muscle is made to contract and can be felt to harden.

The individual tendons most frequently ruptured are:—

Tendo achilles.—This occurs most frequently from sudden severe strains in athletes, but more rarely may occur during mild exercise. The gap is usually palpable about $1\frac{1}{2}$ to 2 inches above the heel, and there is definite loss of plantar flexion. Mention may be made here of cases of open rupture seen by Dillwyn Evans (1946) when factory workers have stepped on the anterior rim of metal rings which have then sprung up from behind. The most satisfactory treatment is open operation with suture of the torn ends.

Plantaris.—This is ruptured as a result of sudden exertion, usually at games (tennis leg). Pain is intense, with stiffness in the calf, and is increased by attempts at plantar flexion; the calf is tender and, later, bruising appears in this area. Treatment consists in strapping the leg firmly with elastoplast, with the heel slightly elevated; massage is instituted and the patient is allowed to get about.

Quadriceps extensor cruris.—This may be completely or incompletely ruptured, generally in an attempt to recover balance after a slip. The tear is usually situated just above the patella, although fracture of the patella or avulsion of the ligamentum patellæ from the tibia may occur. The knee is held semiflexed, extension is markedly impaired and there is a gap in the tendon or in the patella, according to the site of injury. Treatment consists of suture by open operation.

Supraspinatus.—This injury may consist of only a sprain, which needs massage, perhaps an injection of novocain, and early resumption of activity. More commonly there occurs the serious condition of rupture of the tendon, perhaps with dislocation, in active workmen as the result of a severe strain

or fall. It is important to note that pain is referred to the middle of the arm but that tenderness is localized over the insertion of the muscle at the point of the shoulder. The function of the supraspinatus is to anchor the head of the humerus in the glenoid cavity to enable the deltoid to perform its function of abduction. In cases of rupture there is greater limitation of active than of passive abduction when the deltoid is put into active contraction, so that shrugging of the shoulder is the only result of attempts by the patient to elevate the limb. Contraction of the deltoid rules out the diagnosis of injury to the circumflex nerve, whilst the range of passive movement excludes adhesions. In the early and milder cases repair may occur as a result of fixation in abduction and external rotation for periods up to two months or longer. In certain cases, however, it is better to resort to open operation, and suture the ruptured tendon.

Long head of biceps.—This usually occurs in association with osteoarthritis of the shoulder joint where the tendon has undergone degeneration. It may, however, occur in younger and more active people. On bending the arm the contracting muscle belly of the biceps is found to be nearer the elbow, whilst above the muscle is a characteristic hollow. In the majority of cases no special treatment is indicated, but open operation may be undertaken for patients still capable of profitable activity.

Mallet finger.—This is one of the more common types of closed tendon injury and consists of avulsion of the insertion of the extensor communis digitorum from the base of the terminal phalanx, or avulsion of the tendon together with a small triangular portion of bone. It is caused by a blow on the tip of the finger in sport, such as cricket, or may occur in housewives engaged in their daily tasks. This leads to the characteristic flexion deformity of the terminal phalanx and to production of the mallet finger; there is loss of extension, whilst, later, there may be hyperextension deformity at the proximal interphalangeal joint. In treatment, relaxation of the central segment of the extensor tendon is vital to prevent retraction, and this is best achieved by putting the finger in a plaster cast, previously shaped, and extending from the web of the finger to the nail margin; the distal joint is put up in hyperextension with the proximal joint in flexion. Smillie (1936) has described an ingenious method whereby the patient is taught to produce and maintain the required position by pressing on the tip of the injured finger with his thumb whilst a dry tube of plaster is slipped over the finger; the hand is placed in water and the wet plaster is then moulded by the surgeon. Plaster is maintained for six weeks.

Spontaneous rupture of the extensor pollicis longus tendon.—This tendon may undergo a true spontaneous rupture in its groove on the lower end of the radius in those whose occupation involves rapidly repeated movement, for example, the drummer boy. In other cases the groove is made irregular by a posterior marginal fracture or, less commonly, a comminuted Colles's fracture, the rupture occurring some weeks later. This injury leads to loss of

abduction and extension of the thumb. Treatment is operative. The ends of the tendon are so frayed that direct suture is impossible, so that some form of tendon transplantation is necessary to give the best results.

Dislocation of tendons.—Tendons may become displaced from a bony groove when the bands which hold them in position are ruptured. Examples are furnished by the peroneus longus and the extensors of the thumb. There is the usual localized tenderness and pain, and the tendon may be felt to slip out of the groove on movement of the injured part, or there may be an audible snapping. Treatment consists in reduction, with light splintage for a few weeks. More rarely operation may be indicated to suture the fibrous bands.

DIVISION IN OPEN WOUNDS

The division of a tendon in an open wound presents a completely different problem from that of subcutaneous rupture. A larger number of tendons are liable to injury, whilst the intensity of the injury may vary from a small localized cut in the finger to complete severance of a whole group of tendons, as seen in deep wounds in the region of the wrist joint, which may involve practically all the tendons to the digits, as well as other structures, such as nerves. The biggest problem is encountered in cases of compound fracture, and such injuries may tax the ingenuity and skill of the expert for many months. Finally, the problem is complicated and the prognosis impaired in proportion to the amount of infection which may be introduced into such wounds at the time of the injury or may later enter as contamination. Infection is a surgeon's nightmare, and no pains should be spared to keep a clean wound free from contamination, whilst if the wound should be infected, all forces should be fully mobilized against the invading organisms. Even in favourable circumstances when healing *per primam* takes place, the results of treatment of open division of tendons are much inferior to those of subcutaneous rupture. All surgeons are agreed upon the marked deterioration in results that is encountered when sepsis supervenes.

In assessing treatment, a few general principles should always be borne in mind. Lacerated wounds are more difficult to treat than simple incised wounds. All wounds occurring in manual workers should be regarded with suspicion as most likely being infected, whilst a clean cut with glass should be expected to heal with a minimum of reaction. A wound full of oil, dirt or grit must present an anxious problem when a tendon is cut. The possibility of the presence of foreign bodies of any nature should not be overlooked. The site of injury is important; in general it may be said that the more distal the wound the worse the prognosis, so that wounds near the wrist and nearer the muscular portion do better than wounds in the finger. Wounds of the synovial sheath in the palm of the hand or finger increase the liability to adhesions; injury to a tendon in the proximal part of a digit represents the most common injury and yields the poorest result. Injury

to an extensor tendon of a digit offers a more favourable outlook than injury to a flexor tendon. The flexor profundus digitorum is the important tendon to the finger in assessing function, so that if the flexor profundus digitorum and the flexor sublimus digitorum are cut, only the profundus need be sutured. A suture of both leads to adhesions to each other.

Nerve injury may give disability very similar to tendon injury. An important sign in differentiation is the failure of the muscle belly to contract or harden when the nerve is severed. Marked bruising complicates the picture, whilst loss of skin over vital structures, such as tendons and nerves, cannot be allowed to exist for long.

As already indicated, the results of tendon suture of the flexor group are bad, and many surgeons have attempted various methods to obtain a good functional result. The varying technique and diversity of method adequately reflect these poor results.

Before operation can be placed on a sound rational basis it is necessary to have a clear idea of the way a divided tendon heals. When a cut tendon is sutured a rapid proliferation of fibroblasts seals the ends and the whole junction becomes closed in about four days, the area being slightly swollen. This proliferation becomes marked in fourteen days. Tendon cells do not begin to proliferate until after four days and bridge the interval between the two ends of the tendon in two weeks. It is the presence of these tendon cells that provides strength in the union. Splints may therefore be completely omitted after three weeks, but may be removed for short periods after a few days following suture, the free interval being gradually increased.

Operative procedure.—Selection of suture material is important. Whilst catgut is still chosen by some surgeons, the majority favour silk of as fine a calibre as will retain the cut ends in close approximation. Catgut leads to excessive tissue reaction, which in itself leads to a greater tendency to adhesions, particularly within a sheath. Suture material cuts through a tendon easily if inserted in the ordinary, through and through manner, especially in those cases in which marked retraction of the upper part has taken place, and some tension in the suture line is inevitable. Consequently, a main tension suture is employed, or one of the many multiple figure-of-eight stitches which hold well but leave little suture material exposed, or between the ends of the tendon. To ensure more complete relaxation of the suture line Blum (1942) has suggested performing myotomy more proximally.

An operation to repair a cut tendon is a delicate anatomical exercise. It furnishes a splendid example of non-traumatic surgery which should be undertaken in conditions of unimpeachable asepsis. A tourniquet is best applied so that the surgeon can see clearly all important structures and reduce swabbing to a minimum, thereby avoiding adhesions later. Blood clot in the wound as a result of the injury should be washed out with saline. The incision, if longitudinal, should never be over the line of the tendon

but at the side, whilst the cruciate incision should be avoided. If possible, incisions across natural creases should not be made, as they predispose to contractures, bowing and adhesions.

Thorough débridement of the wound is now carried out to remove all devitalized tissues and this promotes healing without infection. Authorities differ on the question of primary suture of a tendon. On the one hand, it is suggested that a clean wound, together with the tendon, may be sutured if not more than four to six hours have elapsed since injury, and that results are better if this can be done. If that be so, the edges of the tendon are trimmed with a sharp scalpel and sutured. On the other hand, a considerable body of opinion holds that results are better if delayed suture be carried out, even in the earliest cases, and that nothing is lost by waiting, especially when the cut tendon belongs to the flexor group. In this case only the wound is sutured. Where tendons are divided within a sheath it is probably better not to adopt primary suture.

In those cases in which primary suture has not been undertaken and the wound heals without incident, a second operation is deemed safe after a few weeks' interval. In the presence of sepsis, tendons should never be sutured and it is well to wait for some months before undertaking secondary suture. Local sulphonamides and penicillin should always be employed as well as internal administration of penicillin and chemotherapy to the full.

Skin loss must be made good to cover important structures. This must be done by a pedicled graft, gauntlet graft or similar procedure.

After operation the part involved is immobilized in the position of rest, so that there is no tension upon the suture line in the tendon.

CONCLUSION

What is the rôle of the practitioner in these cases of open division of tendons? Tendon suture, particularly in the hand, is a question of major surgery and requires a faultless technique with expert knowledge and experience. The surgery is no place to suture a tendon, however small a procedure it may seem to be. A divided tendon should awaken in the practitioner a sense of urgency to transport the patient to hospital where the expert can then function with the proper facilities. With this in mind the practitioner's task is to leave the bottle of iodine on the shelf and to cover the wound with a sterile dressing or at most to put a stitch or so in the skin and apply a light splint. If he must do something vital, let him never forget the injection of antitetanic serum.

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GANGLIA AND SUPERFICIAL TUMOURS

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GANGLIA

ETIOLOGY.—Ganglia may be defined as localized collections of gelatinous substance enclosed in a capsule, associated with joints and tendon sheaths. There is considerable difference of opinion concerning their etiology, and because the process of their formation has some bearing upon methods of treatment it is worth while examining the views that are held. That the causative factor is trauma is accepted by the majority. The almost exclusive appearance of these swellings on the extremities, where the carpal and tarsal joints with the overlying tendons are in a subcutaneous position and subjected to constant impacts, bears this out. Observers have noted the subsequent appearance of ganglia in the vicinity of sprains, bruises and hæmatomas about the dorsum of the hand and wrist, caused by damaging blows during work. It has also been pointed out that the most common position for ganglia to appear is in between decussating fibres of the dorsal ligaments of the wrist joint where underlying joints are exposed.

Concerning the actual process of development of the ganglion the following theories are advanced:—

(A) It is due to a break in the fibrous covering of the joint capsule or tendon sheath, followed by herniation of the synovial membrane.

(B) It is brought about by a mucinous degeneration of a fibrotic change in a limited area of a tendon sheath.

(C) Displacement of an islet of synovial membrane producing a localized cystic tumour analogous to the implantation dermoid arising from skin.

(D) It is a myxomatous degeneration in the subsynovial tissues of the joints (Handfield-Jones and Porritt, 1940).

In refutation of A, it must be stated that at no stage in its development has a passage between the interior of the ganglion and that of the tendon sheath or joint been demonstrated. The contents of a ganglion are not synovial fluid, and it is impossible to reduce the contents of one into its parent cavity. Instead, rupture occurs, if sufficient pressure is applied. The capsule of a ganglion is not lined by a synovial membrane. As regards B, there is no reason to presuppose the primary production of fibrous tissue; none of the many forms of degeneration, other than the constant mucinous one, is found. Ganglia are primarily unilocular, which would necessitate the degenerative process always starting from one point only. This does not accord with the process as observed in other tissues. The intermediate stage when the fibrous nodule is in the process of degeneration has not been demonstrated.

but at the side, whilst the cruciate incision should be avoided. If possible, incisions across natural creases should not be made, as they predispose to contractures, bowing and adhesions.

Thorough débridement of the wound is now carried out to remove all devitalized tissues and this promotes healing without infection. Authorities differ on the question of primary suture of a tendon. On the one hand, it is suggested that a clean wound, together with the tendon, may be sutured if not more than four to six hours have elapsed since injury, and that results are better if this can be done. If that be so, the edges of the tendon are trimmed with a sharp scalpel and sutured. On the other hand, a considerable body of opinion holds that results are better if delayed suture be carried out, even in the earliest cases, and that nothing is lost by waiting, especially when the cut tendon belongs to the flexor group. In this case only the wound is sutured. Where tendons are divided within a sheath it is probably better not to adopt primary suture.

In those cases in which primary suture has not been undertaken and the wound heals without incident, a second operation is deemed safe after a few weeks' interval. In the presence of sepsis, tendons should never be sutured and it is well to wait for some months before undertaking secondary suture. Local sulphonamides and penicillin should always be employed as well as internal administration of penicillin and chemotherapy to the full.

Skin loss must be made good to cover important structures. This must be done by a pedicled graft, gauntlet graft or similar procedure.

After operation the part involved is immobilized in the position of rest, so that there is no tension upon the suture line in the tendon.

CONCLUSION

What is the rôle of the practitioner in these cases of open division of tendons? Tendon suture, particularly in the hand, is a question of major surgery and requires a faultless technique with expert knowledge and experience. The surgery is no place to suture a tendon, however small a procedure it may seem to be. A divided tendon should awaken in the practitioner a sense of urgency to transport the patient to hospital where the expert can then function with the proper facilities. With this in mind the practitioner's task is to leave the bottle of iodine on the shelf and to cover the wound with a sterile dressing or at most to put a stitch or so in the skin and apply a light splint. If he must do something vital, let him never forget the injection of antitetanic serum.

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but usually can be demonstrated to be fluctuant. It is smooth, painless, attached to deep structures, unattached to overlying skin, and transilluminates. It may disappear spontaneously whether or not the work or exercise responsible as an exciting cause is discontinued.

The order of frequency of occurrence is:—

About the hand.—(a) Over the dorsum of the base of the second metacarpal, associated with the carpo-metacarpal or radio-carpal joint (predominantly common position)

(b) Over the other carpal joints on the dorsum of the wrist

(c) On the anterior aspect of the wrist

(d) At the base of the fingers on their flexor surface (Handfield-Jones and Porritt, 1940). Pearce Gould (1938) does not regard these as true ganglia but calls the condition "stenosing tendovaginitis"

About the foot.—(a) On the dorsum of the foot associated with the peroneus brevis, but arising from the underlying tarsal joint

(b) On the dorsum of the foot associated with the tarsal joints and the extensor brevis digitorum sheath

(c) In the region of the external malleolus

(d) In front of the ankle joint

(e) In between the metatarsal bones

TREATMENT.—There is a wide choice in the methods of treatment, and with certain reservations they are within the scope of the medical practitioner to utilize, and so maintain his interest in minor surgery.

(1) *Subcutaneous rupture by pressure*, followed by the application of a tight bandage over a pad for a few days is advocated by many, and a high percentage of "cures" is claimed. The advantages of this method are its simplicity, lack of danger, and absence of scar formation. Its disadvantages are that sometimes it can be very painful; failure to rupture the ganglion will cause the patient to lose confidence and, if there is a recurrence, he or she seldom returns for a repetition of the procedure, which probably accounts for the high percentage of "cures" claimed. McEvedy (1930) suggests that the traumatic inflammation following this procedure is responsible for whatever success is attributed to it.

(2) *Subcutaneous incision of the capsule* of the ganglion by means of a tenotome introduced through the skin to the side of the ganglion, followed by a pressure dressing after dispersal of the contents into the surrounding tissues. This method is advocated by Pearce Gould (1938).

(3) *The use of a seton* is recommended by Rutherford (1938). It consists in passing two or three strands of sterile silkworm gut through the ganglion by means of a needle. The ganglion and the points of entrance and exit of the sutures in the skin are then covered with a pressure dressing for six to seven days. It is again suggested that the success of this method depends upon an inflammatory process—in this case a mild infection. This has been proved to be a simple and effective method.

(4) *The introduction of sclerosing fluids* into the lumen of the ganglion after preliminary aspiration of its contents is advocated by McEvedy (1930), who uses 5 per cent. sodium morrhuate.

The probable mechanism is the production of a rent in the synovial membrane (fig. 1), the displaced portion still maintaining its attachment and consequently its nutrition. The opening in the membrane heals and the displaced synovial shred begins to secrete (fig. 2). This leads to a collection

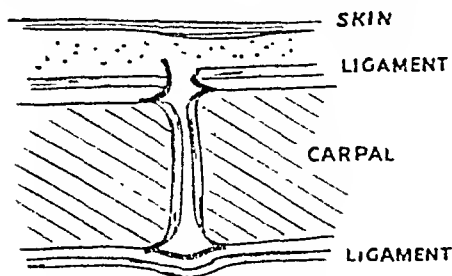


FIG. 1.—Rupture of the synovial membrane.

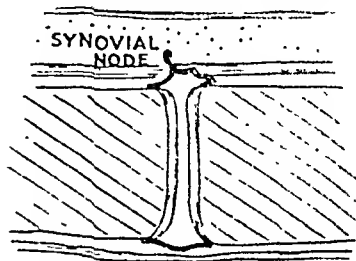


FIG. 2.—Healing of rupture and formation of the synovial node.

of synovial material which is altered by absorption of the aqueous element in the surrounding stroma (fig. 3). The presence of the collection of inspissated fluid calls forth a tissue reaction and the production of a false capsule (fig. 4). This latter process is well seen during operation on a ganglion which has been previously ruptured subcutaneously and has persisted. The jelly-like material which has spread into the tissue planes beneath the skin is covered by the type of capsule which is usually seen covering a ganglion. In time this covering becomes more definite and lined by a layer of flattened cells, the process giving rise to a thick and well-marked capsule near the point of origin from the joint, becoming thinner as the surface is reached.

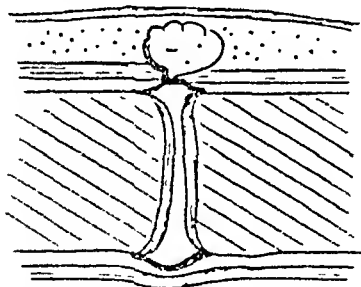


FIG. 3.—Beginning of collection of inspissated synovial material.

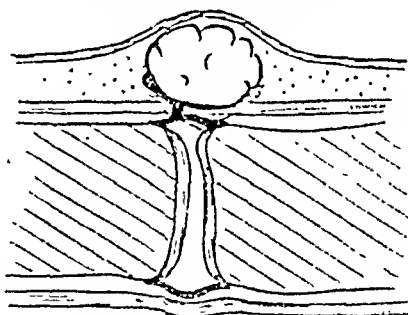


FIG. 4.—Formation of the ganglion and its capsule.

This theory of the mechanism of production explains (a) the invariable attachment of a ganglion to a joint capsule; (b) the altered nature of the contents; and (c) the absence of a typical synovial membrane.

CLINICAL SIGNS.—Clinically a ganglion forms a subcutaneous, circumscribed, rounded swelling which may be so tense as to resemble bony tissue,

true tumours, they are included in this article because of the frequency with which they occur.

Sebaceous cysts.—The development of a sebaceous cyst is brought about by the blocking of the mouth of a sebaceous gland. The subsequent collection of its secretion distends the gland, pushing out the cells which produce the contained material until they form a lining for the cyst wall. They occur in people who have a "leathery" type of skin, that is, a deep epidermal layer of coarse texture with extensive "pitting". Lack of cleanliness is the probable etiological factor in their production. They may be found anywhere on the body surface, but occur most frequently on the scalp, face, neck, upper part of the trunk and skin of the scrotum. Clinically they form rounded, smooth swellings attached to the overlying skin, where a small blackish spot will be found if looked for carefully. Unless there have been attacks of pericystic inflammation, there is no attachment to deeper structures. When uncomplicated, the treatment is operative removal of the cyst and its wall. The small and medium sized are best excised by transfixion with a curved bistoury.

The point of the bistoury is introduced through the skin and the prominent part of the cyst brought up to the surface: the split wall of the cyst is then seen in the bottom of the wound. Both halves of the wall are grasped by artery forceps and, by a combination of dissection and external pressure from the sides, the whole cyst is lifted out of the wound. One approximating suture is sufficient, and a pad with adhesive dressing is applied. When large, the covering skin tends to be redundant after removal of the underlying cyst. In such cases a lozenge-shaped piece of skin should be excised when making the exposure before excising the cyst wall, by the use of a Mayo's dissecting scissors (fig. 5a and 5b).

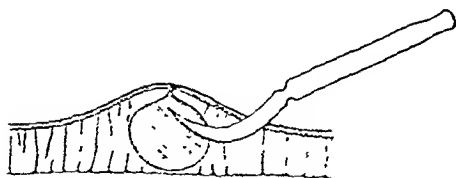


FIG. 5a.—Method of making incision with bistoury.

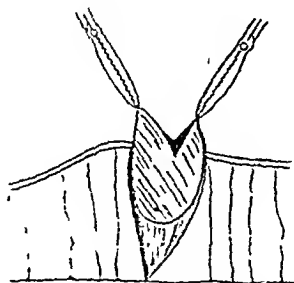


FIG. 5b.—Lifting the cyst and its wall from the incisional wound.

No attempt should be made to remove cysts while in an inflamed condition. Pericystic adhesions render it difficult to remove the wall cleanly and recurrence is usual. If covered and protected from trauma, they will often settle down and operation can be undertaken in a few weeks' time.

When suppuration has occurred, they should be widely opened by incision, the lining curetted and swabbed with iodine, or the cavity packed with 1 per cent. phenol in glycerin dressing.

A wide-bore needle is introduced into the ganglion through the anæsthetized skin, the contents are removed by aspiration combined with pressure over the swelling, and the same quantity of the fluid is then introduced, after which a dressing is applied. The procedure is repeated in a couple of weeks' time. Small ganglia may require more than two or three injections. This method has met with criticism on the grounds of a possible communication with the interior of the associated joint or tendon sheath, and also because of the difficulty of aspiration of the contents. As already stated in this article, such communications have not been demonstrated at operation; their existence has been erroneously deduced because, owing to the intimate attachment of ganglia to joint capsules and tendon sheaths, these have been opened during operative removal of the capsule of the ganglion. If the practitioner avails himself of a needle, as described by McEvedy, he should be able to evacuate the contents successfully. The only disadvantage of this method is the slight pain the patient experiences for a few days, especially after the second injection. The results show a high percentage of cures and no scarring or thickening at the site remains.

(5) *Removal of the ganglion by open operation* is for some surgeons the method of choice. It should, however, be pointed out that recurrences have occurred, and there is the added disadvantage of leaving a scar at the site of operation, which in the case of a young woman will mar the appearance of the hand if the healing process is irregular. Operation should be chosen only when recurrence has followed the use of other methods.

If operation is decided upon, complete excision of the ganglion must be carried out. This will almost invariably entail opening the joint capsules in removing the synovial node responsible for production of the material which forms the contents. It is this opening up of the synovial cavities which constitutes the danger of the method and which makes adequate provision for asepsis essential. Most of the other precautions to be mentioned pertain to the operative treatment.

Because of the dangerous proximity of the median and ulnar nerves with the associated blood vessels, and also the possibility of a mistaken diagnosis concerning the nature of the swelling, ganglia on the front of the wrist should not be "tackled" by a practitioner not engaged in frequent surgical practice.

The use of a sphygmomanometer with the pressure raised to well above systolic blood pressure is essential to ensure a bloodless field for adequate removal. On this account local anæsthesia is unsatisfactory. Ganglia situated between bones are often closely "jammed" against the periosteum, which is very difficult to anæsthetise with a local anæsthetic. In the case of operation on the lower extremity, the patient must have the foot elevated and at rest until the incisional wound is healed. *The use of any tourniquet other than a carefully controlled sphygmomanometer is highly dangerous in the upper limb, and even a sphygmomanometer carelessly used may cause ulnar and median paralysis for many months.*

SUPERFICIAL TUMOURS

CYSTS.—A large number of the "swellings" in the superficial tissues are made up of sebaceous and dermoid cysts. Although the former are not

different from the surrounding subcutaneous fat, the whole tumour being enclosed in a thin, glistening capsule of fibrous tissue which demarcates it from surrounding structures. There are two distinct forms:—

(1) A single form which occurs principally in the subcutaneous tissues of the back, but is not confined entirely to this distribution. When allowed to become large it pushes the skin before it and tends to become pendulous. If encountered before it reaches this stage, it forms a rounded swelling under the skin, in which lobulation can be appreciated, and a rounded edge that can be made to slip beneath the fingers on pressure. It is not attached to structures below it, although it may be difficult to be certain of this physical sign in all cases.

Care should be exercised in the diagnosis of this type of lipoma in two situations; namely, over the side wall of the chest, and in the lumbar region near to the spine (fig. 7), the reason being that cold abscesses which have tracked from tuberculous foci in the ribs and spine towards the surface closely resemble lipomas, due to the abscess cavity being surrounded and masked by a mass of hypertrophied fatty tissue. This covering, produced by the irritation of the chronic inflammatory process, is often indistinguishable from a lipoma, exhibiting lobulation, rolling of the edge, and other characteristic physical signs, *but is attached deeply*. In the forementioned situations careful aspiration with a wide-bore needle should be carried out before a diagnosis is established or treatment undertaken.

(2) A multiple form occurs more commonly than is usually suspected. In a limited surgical experience I have seen seven cases, mostly in young men. The individual tumours are disc-shaped, almost regularly circular in outline, and, although lobulation is difficult to demonstrate, they move freely under the skin and the edges "roll" characteristically under the examining fingers. They occur most frequently on the arms and upper part of the trunk, less often on the lower limbs and seldom on the face. They are painless, but mar the appearance of the arms, and they are often mistaken for neurofibromas.

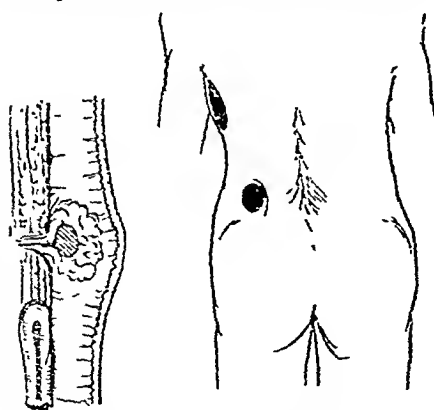


FIG. 7.—The positions in which pseudo-lipomas are found.

The treatment of encapsulated lipomas is operative removal, when cosmetic reasons demand it. In removing them the surrounding capsule should be sought, and this made the plane of dissection. If no capsule is encountered over the single variety, particularly when situated in the aforementioned positions of danger, further attempt at removal should not be proceeded with. The multiple type shells out easily through small incisions made over their centres in the long axis of the limb. Local

anæsthesia is satisfactory for the removal of all but the largest tumours.

Diffuse, or non-encapsulated lipomas are not true tumours, but are of the nature of an excessive deposition of subcutaneous fat, in positions such as the neck and abdominal wall. They are mentioned here because gratifying results may be obtained by the surgical removal of these masses of fatty tissue for cosmetic purposes.

Local anæsthesia is satisfactory in uncomplicated cases, but a general anæsthetic is necessary when opening an infected cyst.

Dermoid cysts.—Superficial dermoid cysts are of two kinds, the sequestration and the implantation dermoids. The former, by reason of the manner of their formation by the trapping of islets of epiblast between ingrowing folds of skin, are confined in their appearance to certain positions which are diagnostic. In order of frequency they are (fig. 6):—

- (a) At the outer angle of the orbit on the frontal bone
- (b) At the root of the nose
- (c) Near the lobe of the ear
- (d) At the side of the nose
- (e) Along a line joining the ear to the side of the mouth
- (f) In the submental position at the middle line
- (g) In the midline anywhere from the chin downwards
- (h) On the skull

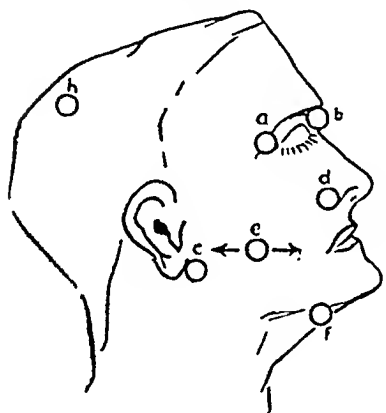


FIG. 6.—Positions in which dermoid cysts make their appearance.

Clinically, dermoid cysts are smooth, globular, fluctuant swellings attached to deep structures but not to the skin. When lying on bone they produce a shallow depression in the outer table, and at an early stage in their development communicate with dura mater through the bone. Although present at birth, they only attain a sufficient size to be appreciable later in life, probably when the gland structures in their wall begin to secrete. Dermoids at the root of the nose must be distinguished from meningoceles and congenital gliomas, the removal of which may include the risk of meningitis.

Implantation dermoids occur most frequently in the subcutaneous tissue of the hands, particularly the pulp of the fingers. They are produced when a small islet of skin is pushed down into the dermis while still maintaining its nutrition. The cells of the Malpighian layer proliferate and their desquamation produces the content of the cyst. Although theoretically a scar should be found in the skin over the site of implantation, it is remarkable how seldom one is seen. Its absence is no bar to the diagnosis.

LIPOMAS

There are two main types of superficial lipoma: (a) the encapsulated, and (b) the diffuse or non-encapsulated.

Encapsulated lipomas are tumours composed of a collection of lobules of fat enclosed in loose areolar tissue, often of a colour and consistency

different from the surrounding subcutaneous fat, the whole tumour being enclosed in a thin, glistening capsule of fibrous tissue which demarcates it from surrounding structures. There are two distinct forms:—

(1) A single form which occurs principally in the subcutaneous tissues of the back, but is not confined entirely to this distribution. When allowed to become large it pushes the skin before it and tends to become pendulous. If encountered before it reaches this stage, it forms a rounded swelling under the skin, in which lobulation can be appreciated, and a rounded edge that can be made to slip beneath the fingers on pressure. It is not attached to structures below it, although it may be difficult to be certain of this physical sign in all cases.

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(2) A multiple form occurs more commonly than is usually suspected. In a limited surgical experience I have seen seven cases, mostly in young men. The individual tumours are disc-shaped, almost regularly circular in outline, and, although lobulation is difficult to demonstrate, they move freely under the skin and the edges "roll" characteristically under the examining fingers. They occur most frequently on the arms and upper part of the trunk, less often on the lower limbs and seldom on the face. They are painless, but mar the appearance of the arms, and they are often mistaken for neurofibromas.

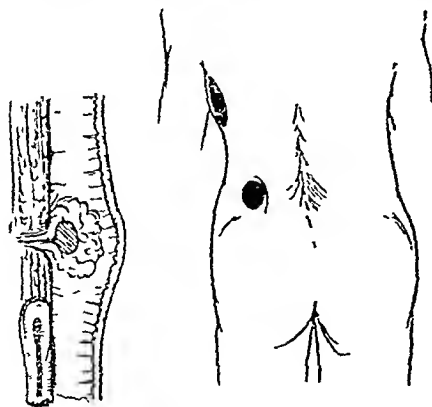


FIG. 7.—The positions in which pseudo-lipomas are found.

The treatment of encapsulated lipomas is operative removal, when cosmetic reasons demand it. In removing them the surrounding capsule should be sought, and this made the plane of dissection. If no capsule is encountered over the single variety, particularly when situated in the aforementioned positions of danger, further attempt at removal should not be proceeded with. The multiple type shells out easily through small incisions made over their centres in the long axis of the limb. Local

anæsthesia is satisfactory for the removal of all but the largest tumours.

Diffuse, or non-encapsulated lipomas are not true tumours, but are of the nature of an excessive deposition of subcutaneous fat, in positions such as the neck and abdominal wall. They are mentioned here because gratifying results may be obtained by the surgical removal of these masses of fatty tissue for cosmetic purposes.

Lipomas not strictly superficial in their origin, but springing from inter-muscular fascia, tendon sheaths, and the periosteum of the skull, project into the subcutaneous tissues, because of the nearness to the surface of the structures from which they spring. Those arising from intermuscular fascia may involve a dissection down into structures not anticipated if tackled without due consideration of their nature.

Lipomas associated with tendon sheaths must be completely removed if operated upon, because it is the admixture of soft fibromatous tissue in some of these tumours that has given rise to the erroneous impression that lipomas can become recurrent and malignant.

General anæsthesia is necessary for the operative removal of this last group.

FIBROMAS

Superficial fibromas exist as (a) simple tumours of white fibrous tissue arising in the stroma of the subcutaneous tissues, and (b) tumours associated with the sheaths of nerves, the so-called neurofibromas.

Fibromas of the first type take the form of roughly globular masses of interlacing whorls of white fibrous tissue, without any definite capsule, varying in consistency from woody hardness to jelly-like softness. They tend on enlargement to push the skin covering them outwards and to become pedunculated. Although the fibroma itself is liable to undergo degenerative changes, the enclosing skin usually maintains its nutrition. They may be found anywhere on the body surface, but seem to have a predilection for the region of the buttocks and lower limbs. Apart from unsightliness they give rise to little trouble, because they are painless. Treatment is excision under local anæsthesia, the root of the pedicle being completely removed through a lozenge-shaped incision around the base.

Two particular types of this tumour must receive special attention:—

The first of these arises from the sheaths covering the muscles of the back of the neck and trunk, and projects into a subcutaneous position. It should be possible to demonstrate its deep attachment when the muscles are tightened. If operation is undertaken, the practitioner must be prepared to remove not only the fibroma, but the muscle sheath, and even the muscle when dispensable, because this type of fibroma has the potentialities of recurrence and ultimate malignancy if incompletely excised.

The other fibroma requiring special mention is the "desmoid" tumour arising in the muscles of the anterior abdominal wall, which sometimes projects into a subcutaneous position. This has a tendency to recur and the removal, which must be radical, is better regarded, like that of the previously mentioned tumour, as a major surgical procedure.

Neurofibromas.—There are four distinct types of neurofibroma.

(1) There is the minute, hard nodule in a subcuticular position in the sheath of a cutaneous nerve terminal. It is usually single, and gives rise to pain if subjected to pressure, in many cases even of the lightest nature. When in an exposed position the patient often becomes aware

of its presence through this extreme sensitiveness. Its removal under local anæsthesia is simple and effective in producing a cure.

(2) The neurofibroma incorporated in the sheath of a superficially placed nerve trunk, e.g., the median, ulnar or external popliteal nerves. It is usually single, the size of an almond, and if "pinched" gives rise to subjective pain in the distribution of the nerve involved. During removal of this type of tumour careful dissection is necessary, because the nerve fibrils, besides being spread out over the tumour, often pass through its substance. General anæsthesia and the use of a sphygmomanometer to ensure a bloodless field are advocated.

(3) Multiple neurofibromas give rise to masses distributed over the whole body in the skin and subcutaneous tissue, varying in size from that of a split pea to a tennis ball, associated with pigmentation, and often painful in nature. Treatment is palliative and consists either in surgical removal or local application of deep X-ray therapy to painful tumours. X-rays do not have any effect on the size of the tumour.

(4) The plexiform neuroma is a localized form of diffuse fibrous thickening of nerve sheaths with hypertrophy of the covering skin. If sufficiently localized and small it may be excised, with skin-grafting later to cover the denuded area.

ANGIOMAS

An angioma is an organized neoplasm of endothelial-lined blood- or lymph-vessels, and the supporting tissues which are associated with them.

Hæmangiomas as subcutaneous tumours occur in three forms, depending upon the type of blood vessel of which they are formed—the capillary nævi, the venous or cavernous angiomas, and cirroid aneurysms.

The first two types are congenital in origin and are occasionally part of a tumour complex made up of fibroma, lipoma or pigment-containing tissues of the nature of a hairy mole or melanoma. The capillary nævi are very superficial and rarely give rise to any irregularity of the overlying skin, whereas the cavernous angioma is more deeply placed and gives rise to swelling and irregularity of the surface skin, causing great deformity when on the face and exposed part. Cirroid aneurysms are tumours arising from arterial blood vessels, arranged to form irregular masses of inter-connecting vascular spaces surrounded by tissues found in arterial walls, and containing arterial blood. They occur on the scalp and the side of the neck, are not present at birth but make their appearance later, and tend to increase in size. Clinically they resemble a pulsating bag of worms under the skin, and when they occur on the scalp cause loss of hair over the surface.

The treatment of capillary nævi has constituted one of the greatest disappointments of surgery. If they are of small size and presented for treatment before they have enlarged during the growth of the child, excision offers the best results: some will disappear spontaneously, leaving "spider-marks". Large ones, if treated by diathermy needle, radium plaque or X-ray therapy, invariably leave a whitish scarring, which is more disfiguring than the original condition.

Cavernous hæmangiomas too large to be excised have reacted favourably to two methods: injection treatment and treatment with X-rays. For injection, quinine and urethane have been used, and more recently sodium

morrhuate: $\frac{1}{2}$ to 1 c.cm. of a 5 per cent. solution is injected deeply into the tumour and repeated at fourteen-day intervals. The results are good and scarring is avoided. The treatment best suited to cavernous angiomas is low voltage, short distance X-ray therapy, using an applicator of sufficient surface size to cover the lesion. The dosage is 300r to 400r once every two months, which will be found to be effective after three to four treatments. An alternative method is the implantation of radon seeds, particularly in the case of those on the body. A dose of 1,000r, or up to 3,000r, will be found to be curative.

Lymphangiomas are usually seen in the form of cavernous lymphangiomas about the neck and shoulders of infants, forming a spongy sessile swelling under the skin which empties on pressure. They do not call for any form of treatment, because they tend to decrease in size as the child becomes older, due to the sclerosing effect of attacks of inflammation to which they are liable.

MELANOMAS

All dark pigment-containing tumours making their appearance during life in a subcutaneous position should be regarded as serious and referred to hospital for major surgical treatment. Congenital pigmented moles, unless very large and on the covered parts of the body, are better left alone, unless there is evidence of an increase in their size. Such increase in size is an urgent danger sign.

If treatment is decided upon, excision should be the choice and should be performed under a general anæsthetic. Although the cells of these tumours should be radio-sensitive, it is found by radiotherapists that treatment by X-ray therapy or radium plaque is ineffective.

GLOMUS TUMOURS

Since Masson described and named these tumours in 1924, they have become the subject of frequent investigation by French and American observers. The consensus of opinion is that they are of the nature of an organoid overgrowth of the normal glomus rather than a true tumour.

The neuro-myoarterial glomus is the name given by Masson to a physiological unit composed of an anastomosis between a small artery of the subpapillary arterial network and a collecting vein in this region, without the intervention of capillaries. The actual anastomosing vessel is termed the "Suequet-Hoyer" canal, and it differs from the ordinary small arteries in the following respects:—(a) it has no elastic intima; (b) it has a narrow lumen capable of closing; (c) it has a thick wall made up of regular rows of large polygonal cells with large central nuclei stippled with a fine chromatin network, the so-called epithelioid or glomus cells, believed to be modified, involuntary muscle cells; (d) it is surrounded by a dense network of nerve fibres, the unmyelinated terminal fibrils of which become continuous with the cytoplasm of the glomus cells.

The anastomosis is embedded in, and surrounded by, a homogeneous

matrix of collagen containing fibrils, in which are scattered involuntary muscle fibres and paccinian corpuscles. These glomus units are about 150 micro-millimetres in cross-section, and are found distributed under the skin of the palmar and plantar surfaces of the fingers, toes, hands and feet, and to a lesser extent of the legs and arms. They are particularly abundant under the nails of both extremities but have not been found on the trunk. Their function has been the subject of investigation and speculation by many physiologists and anatomists. Clark and Clark (1934) are of the opinion that they constitute a heat-regulating mechanism. Popoff suggests that they also regulate arteriovenous circulation and interstitial pressure.

The so-called glomus tumour is an overgrowth of one or other element of the normal physiological glomus and, according to the predominating tissue found, there are three types described:—(a) the angiomatous; (b) the epithelioid, and (c) the neuromatous types.

In the angiomatous type there is a large number of irregular, large and small vascular spaces to be seen microscopically, and in this respect the picture resembles an angioma. In the epithelioid type there is a predominance of the glomus cells, which are scattered throughout the homogeneous matrix as well as arranged in the usual regular columns around the Sucquet-Hoyer canals. No matter which element predominates, however, the presence of the others is essential for the diagnosis of a glomus tumour.

Clinically, the tumour takes the form of a purplish blue, roughly globular swelling, slightly raised when small, domed if large, usually about one centimetre in diameter. It is freely moveable under the skin and over deeper structures, and on palpation may be spongy or tensely cystic. When occurring under the nail it is liable to be mistaken for a melanoma. The tumour is usually solitary and is confined to the common distribution of the glomus bodies. It is exquisitely sensitive. When subjected to pressure, the patient experiences a shooting pain passing up the affected limb (trigger pain), and slight changes in temperature often cause tingling and aching. Although some observers have recorded cases of multiplicity and painlessness (Slepyan, 1944; Weidman and Wise, 1937), the above mentioned features may be taken as characteristic of the glomus tumour. In support of the opinion that a glomus tumour is not a true neoplasm, it should be mentioned that no tendency to malignant change has been observed.

The *treatment* is excision, with the use of a local anæsthetic, the results being complete cure with disappearance of all symptoms.

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BOILS, CARBUNCLES AND CELLULITIS

By R. J. McNEILL LOVE, M.S., F.R.C.S.

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BOILS and carbuncles are common manifestations of "ill-health", and consequently overworked practitioners themselves not infrequently suffer from these tiresome ailments. The predisposing causes include a wide diversity of conditions, such as mental or physical fatigue, too little food or too much alcohol, lack of adequate fresh air and exercise, renal diseases, hypoproteinæmia and hyperglycæmia.

BOILS

A boil (or furuncle) is due to infection of a hair follicle or sebaceous gland; the offending organism is most commonly the *Staphylococcus aureus*. A painful and indurated swelling appears which gradually extends. After two or three days the centre softens and a small slough is discharged with a bead of pus and, in the large majority of cases, the condition then subsides. A "blind boil" is one which subsides without suppuration.

Boils in special situations.—A stye, or hordeolum, is due to infection of an eyelash follicle.

Peri-anal follicles are commonly infected. Suppuration in this region is likely to result in a blind external fistula.

Furunculosis of the external auditory meatus is extremely painful, as the skin is attached to the underlying cartilage, therefore swelling is accompanied by considerable tension.

COMPLICATIONS OF BOILS.—(1) *Cellulitis*, which sometimes spreads extensively, especially in debilitated subjects.

(2) *Adenitis* of the glands draining the affected part. The glands occasionally suppurate, and incision and drainage are then necessary.

(3) *Secondary boils*, due to infection of neighbouring hair follicles or sebaceous glands.

TREATMENT.—This consists in improving the general health of the patient, with special consideration to the predisposing causes mentioned above. A small incision made when pus is suspected, is sometimes useful to relieve pain, but a firm elastoplast dressing is usually adequate and protects the inflamed area. Should softening occur around a hair follicle, particularly an eyelash (stye), removal of the appropriate hair allows the ready escape of pus. Autogenous vaccines are worth a trial in recurrent cases. Smearing the surrounding skin with a mild antiseptic ointment, such as dilute nitrate of mercury, discourages the development of secondary boils due to inoculation. Recently Price (1944) has recommended the application of 70 per cent. ethyl alcohol to the skin in cases of recurrent furunculosis. The fluid is applied by gentle friction for twenty minutes during a quiescent period, i.e., after one crop of boils has subsided and before the next crop develops. In eleven cases so treated there were no

In recurrent cases *chemotherapy* may be of some use, but, as Coleman and Sako (1944) point out, this adjunct to treatment is often disappointing. They recommend that, if boils are troublesome and recurrent, penicillin should be injected intramuscularly. An initial dose of 20,000 units is given, followed by 10,000 unit every three hours, until up to 400,000 units have been administered. Local and general exposure to ultra-violet light is often advantageous.

CARBUNCLES

A carbuncle is an infective gangrene of the subcutaneous tissues, due to staphylococcal infection.

Carbuncles frequently occur on the nape of the neck, as in this situation the skin is coarse and ill-nourished, and in some cases abrasions caused by a stiff collar encourage invasion by organisms. Carbuncles are especially liable to occur in diabetic subjects, and the appearance of a carbuncle sometimes leads to the discovery of this disease. Therefore the urine must be tested in every case, but at the same time it should be remembered that a transient glycosuria occasionally results from a carbuncle. In cases of doubt, blood sugar estimations distinguish true diabetes from transient glycosuria.

The patient complains of tenderness and stiffness at the site of origin of the carbuncle. The subcutaneous tissues become painful and indurated, and the overlying skin is red. Gradual extension occurs, and after a few days areas of softening appear. The skin then gives way and thick pus and sloughs discharge. The condition sometimes extends widely, and fresh openings appear in the skin and coalesce with those previously formed.

Carbuncles on the cheeks and upper lips are particularly dangerous, owing to the risk of cavernous sinus thrombosis *via* the facial and ophthalmic veins, or the deep facial vein and the pterygoid plexus.

TREATMENT consists, in the first place, in dealing with any predisposing conditions mentioned on p. 278. A course of chemotherapy is prescribed and, if available, penicillin should be administered as described in the treatment of boils. Painting the surrounding skin with tincture of iodine is alleged to produce hyperæmia and so raise the local resistance to infection.

A method which is of value in limiting the extension of a carbuncle consists in injecting blood around the periphery. Under light anæsthesia, 20 c.cm. of blood is withdrawn from the patient into a syringe containing 2 c.cm. of 2 per cent. sodium citrate. The blood is injected at several points, each injection beginning in the subcutaneous tissue and terminating in the necrotic area. In order to prevent auto-infection a clean needle should be used for each injection.

Incision of a carbuncle, formerly much in vogue, is now rarely performed, and should be reserved for cases in which the carbuncle spreads rapidly in spite of treatment. A cruciate incision is made and the overhanging edges of skin are freely excised. Necrotic skin and fascia are removed and

the base is wiped with a saline swab. Scraping or curetting should be condemned, as infection is thus spread to deeper tissues, and, in any case, sloughs will separate spontaneously. The wound is packed with a suitable moist antiseptic, such as 1:1000 flavine.

The majority of carbuncles respond to conservative treatment. Either hypertonic saline, or preferably a 10 per cent. solution of sodium sulphate, is applied in the form of gangce compresses, which are frequently changed. Exposure to ultra-violet light, or the application of short-wave diathermy, often gives great relief. The surrounding skin should be protected by some antiseptic preparation, such as gentian violet solution, so as to prevent auto-inoculation. When sloughs have separated, more stimulating dressings are applied, and cases treated on these lines usually do remarkably well. Small carbuncles are often effectively treated by covering them firmly with elastoplast, which is untouched for some days.

Patients should always be warned against squeezing a carbuncle (or, for that matter, any infected focus), as dissemination of infection is thereby encouraged, and in any event local trauma devitalizes the adjacent tissues.

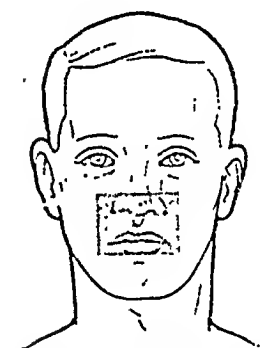


FIG. 1.—The danger area of the face.

Carbuncles of the lip and nose have a sinister reputation (fig. 1), as infection is liable to spread along the angular vein to the ophthalmic veins, and thence to the cavernous sinus. Conjunctival œdema and congestion (chemosis) are the first evidence of this dreaded complication, to be followed by proptosis and blindness if thrombosis of the sinus develops. In the early stages, ligation of the angular vein has been performed in the hope that further spread of infection to the cavernous sinus will be interrupted. A patient suffering from a carbuncle in the "danger" area should be confined to bed and ordered to apply, more or less continuously, pads of gangce soaked in hot saturated

solution of magnesium sulphate. A course of chemotherapy is immediately prescribed and penicillin should be obtained and injected as soon as possible. Cases of cavernous sinus thrombosis have been cured by penicillin, but once thrombosis has occurred permanent damage to the sight is probable. Early surgical treatment of an active carbuncle of the face is contraindicated but, if after a few days localization occurs, an abscess may require a simple incision.

CELLULITIS

Cellulitis is due to spreading inflammation of the subcutaneous and cellular tissue, which sometimes progresses to suppuration or gangrene. In the latter event widespread sloughing of tissues occasionally results. This condition was formerly known as "hospital gangrene", and frequently progressed to a fatal issue.

The *Streptococcus pyogenes* is usually the causative organism, and often

gains admission to the tissues through an accidental wound, trivial in nature, such as a graze or scratch, or possibly as the result of an operation. If the general resistance of the patient is undermined by conditions already mentioned, cellulitis is likely to spread rapidly and extensively.

The clinical features depend upon the virulence of the organism, the resistance of the patient, and the extent of infection. Itching or stiffness occurs at the site of inoculation, to be followed by tenderness and induration. If the condition progresses, gangrene of the superficial tissues may supervene. The general features of infection are usually well marked, and septicæmia or pyæmia sometimes develops.

A typical cellulitis occasionally occurs in which there is no obvious portal of entry for the organisms, and lymphangitis is absent. Portnoy and Reitler (1944) described twenty-one such cases which they encountered in the Middle East. The organism was a hæmolytic streptococcus of Lancefield's group A, which is usually associated with animal rather than human infection. The administration of sulphonamides encouraged localization, and after a week or ten days pus was evacuated by a suitable incision. Convalescence was uneventful. In the case of five patients who did not receive chemotherapy, four terminated fatally.

CELLULITIS IN SPECIAL SITUATIONS.—*Scalp.*—This is due to infection of the sub-aponeurotic layers of the areolar tissue. Pus may extend to the attachment of the epicranial aponeurosis, so that the whole scalp is lifted off the calvarium. Necrosis of bone, or thrombosis of emissary veins, spreading to intracranial sinuses, may follow. Early incisions, parallel to the arteries, are necessary when the presence of pus is suspected.

Orbit.—This follows wounds, or spread of infection from air sinuses in the vicinity. Proptosis and impairment of ocular movements follow, and infection may spread to the meninges, or thrombosis extend along the ophthalmic veins to the cavernous sinus. The eyeball itself occasionally becomes infected (panophthalmitis).



FIG. 2.—Incision for decompression of the space beneath the mylohyoid muscle.

Neck.—This occurs as a complication of wounds, tonsillitis, or mastoiditis. Ludwig's angina is a term applied to submaxillary cellulitis. The two main dangers of cervical cellulitis are œdema of the glottis and mediastinitis. If the patient is threatened with œdema of the glottis, decompression of the mylohyoid space is urgently required. An incision is made beneath the mandible (fig. 2), which extends down to and through the mylohyoid muscle. Tracheotomy instruments should be available until the cellulitis has subsided.

Pelvis.—Not infrequently infection follows lacerations of the cervix uteri, or less commonly results from disease or

the base is wiped with a saline swab. Scraping or curetting should be condemned, as infection is thus spread to deeper tissues, and, in any case, sloughs will separate spontaneously. The wound is packed with a suitable moist antiseptic, such as 1:1000 flavine.

The majority of carbuncles respond to conservative treatment. Either hypertonic saline, or preferably a 10 per cent. solution of sodium sulphate, is applied in the form of gamgee compresses, which are frequently changed. Exposure to ultra-violet light, or the application of short-wave diathermy, often gives great relief. The surrounding skin should be protected by some antiseptic preparation, such as gentian violet solution, so as to prevent auto-inoculation. When sloughs have separated, more stimulating dressings are applied, and cases treated on these lines usually do remarkably well. Small carbuncles are often effectively treated by covering them firmly with elastoplast, which is untouched for some days.

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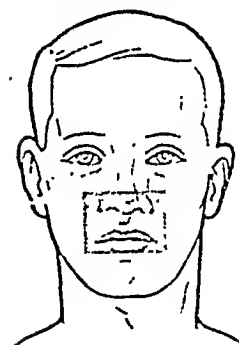


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BURNS OF SLIGHT DEGREE

By A. B. WALLACE, M.B., M.Sc., F.R.C.S.Ed.

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WITH the return to civilian work of many medical practitioners in the Services, it is opportune to suggest that a well-planned propaganda campaign should be carried out against the burn problem, to reduce the occurrence of accidents and to counter the present confusion which exists among medical and lay personnel regarding the treatment of burns.

PROPAGANDA

There is no doubt that a useful type of propaganda can be carried out quietly and unobtrusively by the general practitioner in cooperation with district nurses, health visitors, school teachers, works managers, and others. He can exhibit posters in his waiting-room and in classrooms, with diagrams of the way in which accidents occur and how they can be prevented; for instance, in the average house many fires, especially electric, do not have guards, and children are exposed daily to risk; the upturned edge of the hearth-rug and carelessly placed pots and kettles are also frequent sources of trouble. The home or factory where an accident occurs should, when possible, be visited, investigations made and suggestions offered to prevent a recurrence. In regard to first aid, posters can be exhibited in the surgery, in institutes and in workshops, and the general practitioner, by instruction and example, can reduce meddlesome interference by well-intentioned parents, neighbours, or first-aid workers. Principles of care have to be taught, but will follow from a proper understanding of first aid. Care must, however, continue throughout the course of treatment.

DEFINITION

A burn of slight degree is any burn which can and should be controlled by the practitioner; it may be (a) a small, or (b) a minor burn. A small burn needs no further discussion. A minor burn is superficial, affecting up to one-tenth of the body surface (anterior surface of the hand is 1 per cent. of the body surface), and not involving flexures or areas liable to contamination by natural discharges.

FIRST-AID TREATMENT

If the patient's clothes are in flames, he is wrapped in a blanket and rolled on the floor. He is then put to bed. The exposed parts of the burn are covered with a clean, dry sheet, towel or cloth, and the patient is wrapped

injury to any of the pelvic organs, such as extraperitoneal rupture of the bladder. In cases which follow child-birth, infection frequently creeps up the side of the pelvis and an indurated swelling appears above Poupart's ligament. In the first two or three weeks, on rectal or vaginal examination, a firm, tender pelvic mass can be palpated, but often by the time the swelling appears above Poupart's ligament the mass in the pelvis has resolved and is no longer evident.

In the early stages of pelvic cellulitis, hypogastric fomentations and vaginal douches are useful. If the swelling appears above Poupart's ligament and deep œdema or softening is detected, the abscess is incised and drained extraperitoneally. Posterior colpotomy is sometimes useful if a collection of pus collects in the pelvis. In cases of cutaneous cellulitis, treatment consists, in the early stages, of the application of warmth, rest to the affected part, and sulphonamide therapy. Most cases rapidly resolve as a result of an adequate course of chemotherapy. If pus is suspected, free incisions are made in the axis of the limb, down to the deep fascia. This is followed by baths or compresses of hypertonic saline (10 per cent.) which encourage lymphatic drainage. Excessive moisture is harmful as it renders the skin sodden, which encourages spread of infection.

The general health of the patient must receive attention, and, if considered advisable, a course of penicillin is prescribed.

CHRONIC CELLULITIS.—An unusual form of chronic cellulitis of the neck occasionally develops, and is worthy of mention, as the condition may involve errors in diagnosis by the practitioner. The term "woody phlegmon" is apt, and was the name given to the condition by the Parisian surgeon, Paul Réclus, who first described it. One side of the neck gradually becomes swollen and extremely indurated, so that after two or three weeks it resembles leather. The overlying skin is reddened and slight œdema is usually detectable. At this stage the "phlegmon" closely resembles actinomycosis, especially as there is little pain and no constitutional symptoms. After a further interval of a few weeks, areas of softening appear, and small quantities of pus are discharged as the overlying skin is eroded. The condition is now somewhat suggestive of advanced malignant disease. After many months the inflammation gradually subsides.

The condition is probably due to infection by an attenuated staphylococcus, and treatment is conducted on general principles, combined with an incision over any area where the presence of pus is suspected. Chemotherapy has little influence on the progress of the disease.

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upon (a) the physician, (b) the home of the patient, (c) the patient, and (d) the burn.

(a) A physician should as a rule employ the method of which he has had most experience and in which he has most confidence, but many factors may modify his choice: he may not have assistance; there may not be facilities for adequate cleansing; the time of his next visit may be uncertain. In such circumstances, the local application should have some bacteriostatic effect and the affected part must be efficiently immobilized.

(b) The social amenities of the patient's home may be far from satisfactory: conditions may be squalid; supervision may be absent. On the other hand, there are homes with all conveniences but over-abundance of attention, amounting at times to interference. In such circumstances immobilization is required over a dressing which is left until healing is completed.

(c) The age and occupation of the patient will influence the procedure to be adopted. With babies and children, infrequent dressings are advisable, and when possible a coagulating jelly is employed. In adults who must continue their work during treatment, a bacteriostatic cream or paste is applied and the injured part immobilized, if necessary, with the aid of plaster of Paris.

(d) Obviously the size of the burn will influence the nature of the treatment. A further factor will be the age of the burn: delay in the institution of proper control leads to the establishment of infection.

In *small burns*, blistering can be prevented by the immediate application of a spirit dressing, and constant pressure. If blistering has occurred, the fluid is evacuated by the use of a sterilized needle, and a spirit pressure dressing is applied.

In the treatment of *minor burns* (that is, up to 10 per cent. of the body surface), various applications are available; when cleansing facilities are adequate, a coagulating jelly or pressure dressing may be used.

Coagulating jellies.—I have experienced excellent results following the application of "amertan" (Lilly). The surrounding skin and then the burn are cleansed carefully and all raised epithelium removed. A thick spread of jelly on two layers of gauze is applied with a second similar spread superimposed. The spreads are covered with gauze and wool and fixed with a bandage. After forty-eight hours the dressings are removed down to the spreads, for scrutiny, and any moist areas are excised and further spreads applied. The dressings are then left for twelve to fourteen days, when they are removed as a complete cast and a healed surface is found. This method is not advised for burns of the hand.

Pressure dressings.—This method is becoming increasingly popular but should be employed only when the medical attendant has had experience of it. The burn is carefully cleansed (some authorities omit this step), and

in blankets with hot bottles placed between them. Hot sweet drinks are supplied. On no account must clothing be removed or further dressings applied, except in the case of a patient living some considerable distance from medical aid, when a dressing with baking soda paste would bring some relief. Baking soda is mixed with sufficient water (which should have been boiled and cooled) to make a thin paste which is spread on gauze, lint or a clean handkerchief; such a dressing can be readily removed by the practitioner and will not interfere with any further treatment.

TREATMENT BY MEDICAL PERSONNEL

The fundamentals of treatment are relief of pain, prevention of infection, and physiological rest.

Relief of pain.—If the pain is severe, a hypodermic injection of morphine or heroin is administered; not more than a $\frac{1}{4}$ of a grain should be given at one time, even to adults. A second dose may be given after one hour. The addition of anæsthetic agents to local applications does not have any effect.

Prevention of infection.—A burn of slight degree heals within fourteen days, provided infection of the surface does not take place. In some patients a spreading cellulitis or lymphangitis may develop, but the most serious infection results from the hæmolytic streptococcus. Staphylococcal infection of a fresh burn may also be troublesome. It should be remembered that although the epidermis of the back of the body is thin and the dermis thick, on the palm of the hand the epidermis is thick and the dermis thin, so that superficial lesions of the palm, if infection occurs, may be followed by death of the skin and by contractures.

Thorough but gentle cleansing of the burn when first seen is advocated. Except in small children, it is possible as a rule to clean a small burn without resorting to inhalation anæsthesia, provided care and gentleness are exercised. The skin surrounding the burn is washed with cetavlon, 1 per cent. or with white soap and water. The burn is then cleansed with gauze soaked in cetavlon, 1 per cent., or in sterile warm normal saline solution. All tags and raised epithelium are carefully removed, except on the palmar aspect of the fingers and hands, where blisters are snipped and the epidermis left. In the process of cleansing, alcohol or ether solutions are harmful, since they lead to profuse serous exudation and pain.

Rest.—Injured tissues require rest: it is essential for satisfactory healing. A patient with a burn of the lower extremity should be put to bed; in the case of a burn of the upper extremity the arm is placed in a sling. In some instances rest can best be assured following the application of a plaster of Paris splint to control the adjacent joints. When possible, the affected part is elevated to limit the formation of œdema, which, if once established, delays the healing processes.

LOCAL APPLICATIONS.—The choice of local applications depends

upon (a) the physician, (b) the home of the patient, (c) the patient, and (d) the burn.

(a) A physician should as a rule employ the method of which he has had most experience and in which he has most confidence, but many factors may modify his choice: he may not have assistance; there may not be facilities for adequate cleansing; the time of his next visit may be uncertain. In such circumstances, the local application should have some bacteriostatic effect and the affected part must be efficiently immobilized.

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covered with tulle gras or vaseline gauze; light pressure is secured by the application of a crêpe bandage over a liberal supply of cotton-wool, the aim being to obtain an even pressure of about 10 to 15 mm. Hg over the burn, and so to prevent loss of fluid and limit œdema. Finally, a plaster slab is applied to establish immobilization and at the same time to make the position of elevation easier to maintain. For the first few days frequent scrutiny is required.

When there is any doubt as to the adequacy of cleansing facilities, one of the following creams may be used:—

Sulphonamide cream.—This cream may be applied direct by a sterile spatula or as a spread on gauze, and is left for seven to ten days, or even twelve days, unless the area is around the mouth and nose, or the perineum and buttocks. The burn may be healed by the first dressing, but if not, it is immediately re-dressed with cream without any washing of the surface; this dressing in turn is left for a further five to seven days. The formula of the cream used in the Glasgow Burn Unit is:—

Sulphanilamide..	..	..	..	..	3 gm.
Sulphathiazole ..	..	..	..	..	3 gm.
Glycerin ..	..	..	..	..	10 gm.
Castor oil ..	..	..	..	..	25 gm.
Lanette wax SX	..	..	..	..	10 gm.
Water ..	..	..	..	..	49 gm.

Preparation: Heat 25 gm. of castor oil to 70° C. and add 10 gm. of lanette wax SX. When the wax is completely melted, add water (49 c.cm. previously heated to 65° C.) with gentle stirring to avoid incorporation of air. Heat the whole to 100° C. for at least thirty minutes to kill non-sporing pathogens, and shake as it cools. Rub up the sterile sulphanilamide and sulphathiazole powders, 3 gm. of each in a sterile mortar with 10 gm. of glycerin. Heat to 65° C. for two hours and then mix slowly with the base. Store in a sterilized jar and keep always covered.

Penicillin cream.—To eliminate hæmolytic streptococci, and staphylococci, from burned surfaces, a penicillin cream is the most effective. The base is prepared as for the sulphonamide cream. Penicillin powder, either sodium or calcium salt, according to its unitage, is dissolved in sterile distilled water to make a solution of about 800 Oxford units per c.cm. Of this solution, 5 c.cm. are added to 30 gm. of the base and thoroughly mixed. The final strength is about 120 units of penicillin per gramme of cream. When kept at room temperature, this cream retains its activity for fifteen days, and for at least four weeks when stored in a refrigerator at 2° C.

A cream employed with success in the General Hospital, Montreal, consists of sulphathiazole (finely powdered) 5 per cent., triethanolamine 2 per cent., distilled water 24 per cent., white beeswax 5 per cent., and liquid paraffin 64 per cent. Dressings are left in place for seven days.

INFECTED BURNS

Since physiological rest is essential, the patient is put to bed. When possible, cultures of the burned surface are taken. The local application

depends upon the result of the culture and also upon the medicaments available. Local penicillin, sulphathiazole or propamidine are valuable in streptococcal and staphylococcal infections. Of the antiseptic solutions, proflavine and eusol have proved most serviceable, and are applied three times a day on gauze over a layer of tulle gras, the tulle gras being renewed once in twenty-four hours.

SPECIAL BURNS

Mucous membranes.—The mouth, nose and throat may be affected by the inhalation of flame or hot air, or by the swallowing of acids or alkalis. Burns by iodine, phenol or lime, of the mucous membrane of the lips and mouth, should be treated by frequent bland mouth washes followed by any mild oral antiseptic, such as hydrogen peroxide. It is unwise to use a neutralizing agent. Borax ointment, petroleum jelly, lanolin or cold cream is applied to the lips.

Eyelids and eyes.—In burns of the eyelids, coagulants must not be applied, since by their splinting action they may lead to exposure keratitis; a smear of petroleum jelly or cold cream is usually all that is necessary. Burns of the eye may lead to (1) injury of the cornea and (2) adhesions between the eyeball and the lids. Immediate treatment consists of irrigation of the conjunctival sac with normal saline solution or tepid water, and instillation of a few drops of cocaine hydrochloride. Thereafter, a 1 per cent. solution of atropine sulphate is dropped in twice daily and liquid paraffin four-hourly. If adhesions appear to be forming, soft paraffin should be packed in the fornix with a glass rod.

CHEMICAL BURNS.—All contaminated clothing must be removed.

Lime.—All particles must be removed before any washing is attempted. In the eye, the particles are most often found on the under surface of the lids.

Nitric acid.—Recently, Roberts (1941) reported an excellent result by rubbing with chlorine (eusol) solution.

Caustic soda.—The affected part should be irrigated immediately with a 5 per cent. solution of ammonium chloride; if this is done within thirty to forty seconds of contact, a burn will be prevented. If a burn has resulted, its severity is greatly lessened by the same method of treatment. An injury to the eye should be treated by irrigation with 5 per cent. ammonium chloride solution, followed by irrigation for one hour with warm boric-saline lotion.

Reference

Roberts, H. M. (1941): *Brit. med. J.*, **1**, 361.

HÆMORRHOIDS AND THEIR TREATMENT

By LIONEL E. C. NORBURY, O.B.E., M.B., F.R.C.S.

Senior Surgeon, Royal Free Hospital; Consulting Surgeon, St. Mark's Hospital for Diseases of the Rectum.

HÆMORRHOIDS are described as *internal* or *external*. Internal piles are varicosities arising in the hæmorrhoidal plexus of vessels at the lower end of the rectum and are covered by mucous membrane. External piles arise at the anal margin and are covered by skin. Internal and external piles are often present together.

There are certain anatomical factors which predispose to the formation of piles:—

(1) The hæmorrhoidal vessels are situated in loose submucous tissue and are unsupported.

(2) The hæmorrhoidal plexus of veins is at the junction of the systemic and portal systems.

(3) There are no valves in the veins.

(4) The erect position of the body.

The superior hæmorrhoidal vessels are chiefly concerned in the formation of internal piles, and the middle and inferior hæmorrhoidal vessels in external piles.

There are usually three main internal piles, which correspond to the terminal branches of the superior hæmorrhoidal artery, and in the lithotomy position to the positions of 3 o'clock, 7 o'clock and 11 o'clock, or, in other words, a left lateral pile, a right anterior and a right posterior pile. Small secondary piles may be present between these.

ETIOLOGICAL FACTORS

These include straining, due to constipation; any form of intra-abdominal pressure, such as that due to pregnancy or abdominal tumours; portal congestion in cirrhosis of the liver; new growths and other forms of obstruction arising in the wall of the rectum or colon. There are three degrees of internal piles:—(1) Those which do not prolapse; (2) those which prolapse on straining but spontaneously replace themselves when straining ceases; and (3) those which are permanently prolapsed.

EXTERNAL PILES

External piles may be acute or chronic. *The chronic type* consists of tags of skin around the anal margin. These are not piles in the true sense of the word, but are probably the result of previous attacks of acute thrombosis which have subsided, leaving swollen and thickened portions of skin. In themselves, these tags of skin are of little consequence except that they are sometimes associated with anal pruritus.

There is some doubt as to the origin of the *acute type*. These are regarded by some as due to thrombosis in a venous external pile, the result of some form of trauma, such as a sudden strain. Others regard these acute swellings as due to rupture of small veins, with a resulting hæmatoma. This appears to be the more likely explanation.

The "acute" pile may be single or multiple. It is very painful as the result of tension. The overlying skin is dark blue or purple in colour, and it is very tender to the touch. Bleeding occurs if one of these swellings bursts; possibly the result of attempts to return it to the rectum, where, of course, it does not belong. If left alone, or treated by lead lotion compresses and hot baths, these swellings may subside. Immediate relief, however, can be obtained by excision of the hæmatoma or by turning out the clot under local anæsthesia. Excision is better, since this avoids a residual cavity which may result in the formation of a fistula.

INTERNAL PILES

CLINICAL FEATURES

(1) *Bleeding*.—This may occur at the time of defæcation, and is often the only indication of the presence of piles of the "first degree". Bleeding may occur at other times when the piles remain prolapsed, and soiling of the clothes results.

(2) *Discharge of mucus* with soiling of the clothes.

(3) *Pruitus ani*, the result of a leakage of mucus which dries on the skin, producing irritation and subsequent excoriation of the skin from scratching.

(4) *Pain* is not a symptom of uncomplicated piles and only occurs with attacks of thrombosis and local œdema.

COMPLICATIONS

(1) *Hæmorrhage*.—This may be severe on occasion and accompanied by profound anæmia. I have seen patients quite blanched with very low percentage of hæmoglobin, entirely the result of bleeding piles.

(2) *Prolapse*.—Internal piles may remain prolapsed, and as a result the covering mucous membrane undergoes epithelialization, indicative of long-standing prolapse.

(3) *Irreducibility and strangulation*.—As a result of straining, piles which tend to prolapse may be forced through a tight sphincter and become œdematous and irreducible. If such a condition be allowed to remain, and if the piles are not speedily reduced, thrombosis and strangulation may ensue (fig. 1).

(4) *Suppuration* may follow thrombosis and strangulation, with the formation of a "submucous abscess".

(5) *Ulceration* may also be a sequel of thrombosis.

(6) *Fibrosis* may follow thrombosis, with resulting fibrous polypus or polypi.

(7) *Suppurative pylephlebitis* or *portal pyæmia* is a rare complication, and

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Abdominal examination may reveal the presence of an enlarged liver, abdominal tumours, or diverticulitis of the colon, any of which may be causative factors.

X-ray investigation.—A barium enema may occasionally be helpful in cases of doubt as to the presence or otherwise of lesions higher up the colon, when sigmoidoscopy has revealed nothing abnormal.

TREATMENT

External hæmorrhoids.—The treatment of the so-called acute external pile has already been indicated.

Chronic external piles, or anal tags, may not cause any symptoms and treatment is then unnecessary. If, however, their presence is associated with irritation, then they can be readily removed under local anæsthesia. If associated with prolapsing internal piles, they may disappear, or at any rate diminish in size, as the result of injecting the corresponding internal piles. A dorsal skin tag may be associated with a fissure, and in such a case a radical operation for removal of the fissure and tag is best.

Internal hæmorrhoids.—I would again emphasize the importance of routine digital examination and sigmoidoscopy before undertaking treatment. The methods employed in the treatment of internal piles may be classified as follows:—(1) Palliative or expectant; (2) injection of chemicals; (3) removal by operation.

(1) *PALLIATIVE OR EXPECTANT TREATMENT.*—Such treatment is symptomatic and includes (a) the application of astringents or hæmostatics for the control of hæmorrhage; (b) analgesic preparations for relief of pain; (c) the relief of rectal spasm by the use of morphine and belladonna suppositories; (d) the cultivation of the habit of having an action of the bowels at night instead of the morning in cases associated with prolapse, so that the piles may be reduced and the patient enabled to remain for some hours in the recumbent position, thus avoiding straining, pressure and congestion.

Palliative treatment is essential when certain complications are present, e.g. thrombosis and sloughing. It is dangerous to operate upon piles in such an infected state. Post-operative ulceration and stricture formation may follow, or the rare condition of suppurative pylephlebitis or portal pyæmia.

The immediate treatment of thrombosed piles is rest, hot fomentations, hot perchloride of mercury (1 in 1000) or lead lotion compresses, and baths. Occasionally such piles slough off and no subsequent operative treatment may be necessary. At other times, piles and tags of skin remain and are best removed by operation.

Piles that suddenly prolapse and are gripped by the sphincters should be reduced without delay, lest they may become irreducible and strangulated. Inhalation anæsthesia or an injection of pentothal may be necessary in order to overcome spasm and pain.

may follow acute thrombosis and strangulation, especially if there is any operative interference during the acute stage. Operative treatment at this stage is contraindicated. I have seen only two cases of portal pyæmia resulting from piles.

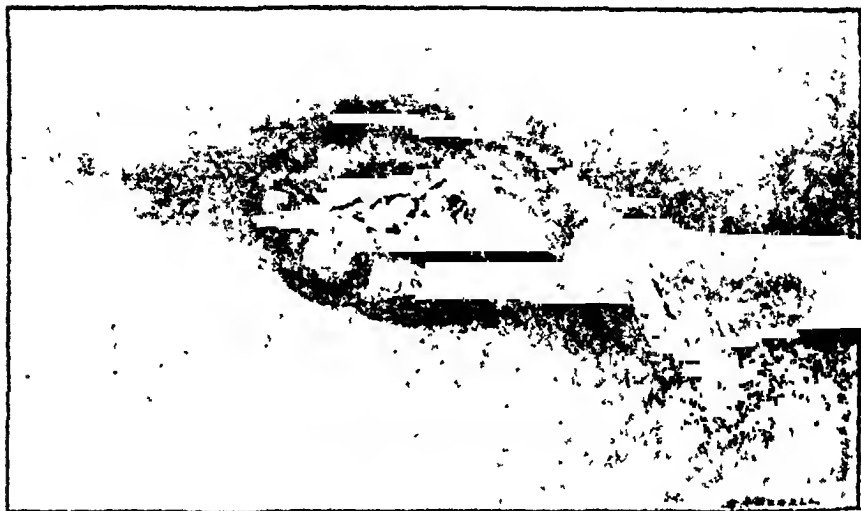


FIG. 1.—Irreducible and thrombosed piles.

DIAGNOSIS

Inspection will only reveal the presence of internal piles when they are prolapsed. Large internal piles may be present without any external evidence.

Digital examination.—Large uncomplicated internal piles may be present without any evidence from the examining finger. Thrombosed or fibrotic piles will be readily felt. Digital examination may reveal the presence of a growth higher up the rectum.

Proctoscopy.—An examination with the proctoscope is essential, in order to establish a diagnosis and to ascertain the number of piles, the degree of prolapse, and the presence of other associated conditions, such as anal papillæ or polypi.

Sigmoidoscopy.—Too much emphasis cannot be laid upon the importance of routine sigmoidoscopy in assessing the cause of internal piles, or the presence of accessory causative factors. On many occasions, by this means, large papillomas or carcinomas have been unexpectedly detected in the rectosigmoidal region or lower pelvic colon. I would instance the case of a man aged about thirty-six years who had recently developed internal piles which bled, and for which he came to hospital for treatment. Sigmoidoscopy showed a malignant growth when the instrument had been passed to its full length.

previously treated is not marked, 5 to 10 minims of a 20 per cent. solution of phenol in equal parts of glycerin in water injected into the pile itself will often complete the treatment.

Injection treatment for internal piles is ambulatory and there is no need for the patient to "lie up". He should, however, avoid strenuous exercise on the day of injection.

Injection treatment for piles will rarely produce a permanent cure, but many months or even several years of relief from symptoms may be expected. A further series of injections may be given. Occasionally, a few hours after an injection with phenol in vegetable oil, the patient may have an attack of shivering, accompanied by a rise of temperature to 101° or 102° F., and feel as though he had an attack of influenza. The symptoms may last for several days. A subsequent injection may produce a similar result, and the dose must be diminished accordingly, or else the injections stopped. This complication is probably due to "protein shock".

OPERATIVE TREATMENT.—The treatment of external piles has already been indicated. Cases of internal piles requiring operation are those deemed unsuitable for treatment by injection. Large prolapsing piles, piles which are partly internal and partly external, and those associated with some other lesion, such as a fissure, are best treated by operation. An operation will probably necessitate a stay of ten to fourteen days in hospital.

Anæsthesia.—For premedication an injection of omnopon, $\frac{1}{2}$ of a grain, with scopolamine, $\frac{1}{150}$ of a grain, is useful. A low spinal anæsthetic is ideal in such cases. Local infiltration anæsthesia, using a 1 per cent. solution of novocain, with or without the addition of adrenaline, is also most satisfactory and may be employed at any age and in any condition of health, with the minimum of discomfort. Perfect relaxation of the sphincters is obtained. If the patient is nervous, local anæsthesia may be combined with intravenous pentothal. Pentothal alone will often suffice.

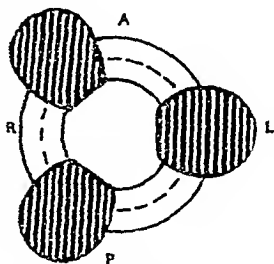


FIG. 2.—Diagram showing areas left after removal of the three primary piles, with intervening portions of intact skin and mucous membrane.

Technique.—Many types of operative procedure have been described, but the simple method of ligature and excision is eminently satisfactory. The operation which is mostly employed for removal of hæmorrhoids at St. Mark's Hospital is that based on the anatomy of the component parts of the pile and of the related muscles, details of which are recorded in an illuminating article by Milligan *et al.* (1937). Each pile, i.e., the internal and external hæmorrhoidal plexuses with their respective coverings of mucous membrane and anal skin, is transfixed at the level of the anus, and no higher, with strong catgut or silk threaded on a curved round-bodied needle and the ligature tied firmly. The end of each pile so treated is cut off, leaving a good stump beyond the ligature to prevent slipping. It is important to leave strips of intact skin and mucous membrane between the wounds left after removal of the piles (fig. 2) for purposes of regeneration, and so to lessen the possibility of stricture formation. It is of the

(2) *INJECTION TREATMENT*.—External piles should never be injected, since sloughing and abscess formation are liable to result. Uncomplicated internal piles are most suitable, i.e., those which do not prolapse to any marked degree and which are not thrombosed or septic. Fibrous internal piles are unsuitable, and so are piles associated with an anal fissure or fistula.

(a) It is eminently suitable for "first degree" piles in which the main symptom is hæmorrhage.

(b) "Second degree" piles often respond well to such treatment. Relief may be obtained for some months, or even years, but the results are not usually permanent.

(c) Injection treatment is not satisfactory for "third degree" piles, except as a temporary expedient, such as relief of hæmorrhage. Some improvement may, however, be obtained.

Technique of injection treatment.—The solutions usually employed are:—

(1) A 5 per cent. solution of phenol in a vegetable oil. This solution was originally used by Allbright and Blanchard.

(2) Liquid carbolic acid, 48 minims, and glycerin and distilled water, 120 minims. This makes a 20 per cent. solution. Carbolic acid in strengths over 20 per cent. produces sloughs or marginal abscesses. As previously mentioned, three primary piles are usually present.

The knee-chest position is best in males and the left lateral position, with a pillow under the hip, in females or elderly males. By means of a speculum the injection is made into the submucous tissue well above the pile. The correct level for injection is just above the ano-rectal ring—this is the junction of the anal canal and rectum. When a speculum is passed into the rectum and the obturator withdrawn, air passes into the rectum and the lumen opens up. On gradually withdrawing the speculum, the mucous membrane begins to protrude into the instrument. The speculum is then inserted until this cuff of mucous membrane disappears, and the injection is made into the submucous tissue forming the pedicle of the pile at the level of the ano-rectal ring. Usually 3 c.cm. of a 5 per cent. solution of phenol in vegetable oil are sufficient. If the pile is large or the mucous membrane lax, a larger quantity up to 10 c.cm. may be necessary. The rectal mucous membrane is quite insensitive to pain, unlike the lining of the anal canal, which is very sensitive. If the pile is bleeding, inject 3 c.cm. well above the pile and a further 2 c.cm. just above. Hæmorrhage nearly always ceases after one such treatment. By injecting well above the pile-bearing area, the feeding vessel becomes surrounded by inflammatory tissue and thrombosis occurs, followed by fibrosis. Contraction of fibrous tissue "tightens" the mucous membrane and so tends to "pull up" prolapsed and lax tissue. Little discomfort, beyond a feeling of fullness, results.

The injection must be made into the submucous tissue and not into the mucous membrane, when ulceration may follow. Injection into the mucous membrane is shown by a white area appearing at the site of puncture. If this occurs the injection must be stopped and the needle re-inserted. A second pile should be similarly treated in about seven days, and the third pile about seven days later. If there is not much local swelling after injection of one pile, a second pile may be injected at the same time.

A successful result is indicated by induration at the site of the previous injection. After three injections, a firm boggy swelling can be felt surrounding the lumen of the rectum. If on subsequent examination induration of the pile or pile-

SOME EVERYDAY PROBLEMS IN THE TREATMENT OF VARICOSE VEINS

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THE majority of busy practitioners will surely agree that there is some truth in the title of this article, since there can scarcely be a day in their lives when they are not confronted by some problem in the treatment of varicose veins and their complications. There are undoubtedly differences of opinion regarding the prevalence of this disease, but it does seem fairly safe to assume that approximately one out of every ten of the population are afflicted with some degree of varix. From this fact it can readily be appreciated that the full "evening surgery" must perforce present a good many cases.

The object of this article is to help the practitioner to appreciate the different forms of treatment in present-day use, to make a correct diagnosis, and to place his cases in the proper categories for the selected form of therapy.

The three main types of treatment which are available are:—(1) Conservative; (2) injection; (3) operation, or the combination of operative and sclerotic treatment. It is into one of these groups that the practitioner must endeavour to fit his patient.

First, take the case of *uncomplicated varicose veins* of the lower extremities. What class of patient must necessarily be condemned to "conservative" methods only, and what are the various methods of treatment available under this heading?

(1) *Patients requiring treatment by conservative methods*

- (a) Those suffering from advanced age or senility.
- (b) Patients who are pregnant.
- (c) Those suffering from severe impairment to the arterial blood supply.
- (d) Those cases in which a deep vein thrombosis is present.
- (e) In all those cases in which a pelvic tumour is a causative factor in the varices.

(a) *Senility*.—Obviously, if the expectation of life is considered to be very short, conservative methods only should be employed. This does not, however, apply to those cases which are complicated by ulceration, phlebitis or eczema. In such, a high ligation of the internal saphenous vein may be a rational treatment, even late in life, and many a septuagenarian has received much benefit from such treatment.

(b) *Pregnancy*.—All active treatment should be delayed until a few months after child-birth. The veins may quite frequently improve after this time.

utmost importance to remove any redundant portions of skin and so leave a neat smooth surface. If the skin is not carefully trimmed, prominent tags are evident when the wounds left after removal of the piles have healed. The patient feels these tags of skin, and thinks that piles have been left behind. Such tags also cause irritation.

After-treatment.—I usually squeeze the contents of a tube of sterilized petroleum jelly into the rectum before inserting a small rubber tube. Around the tube three portions of gauze soaked in a solution of flavine in paraffin, 1 in 1000, are placed with the ends just inside the anal canal. These portions tend to keep the tube in position, and also protect the raw surfaces left after removal of the piles. The tube is removed in twenty-four hours. The area of operation is irrigated twice daily with a weak solution of an antiseptic, such as dettol, and a pad of gauze is kept in position by a firm T-bandage. The bowels are kept confined until the third day after operation. Liquid paraffin, $\frac{1}{2}$ ounce, is given twice on the second day after operation, and liquid cascara, 120 minims, on the second night. As an alternative, castor oil, 1 ounce, is given early on the third morning, followed by an injection of 4 ounces of warm olive oil into the rectum by means of a small soft catheter, as soon as an action of the bowels appears imminent. The patient gets out of bed on to a commode to evacuate the bowels. A bed-pan is unnecessary and should be avoided. Baths should be employed once or twice daily after the bowels have acted. The portions of gauze left in the anal canal at the time of operation usually come away with the action of the bowels, or subsequently in the bath. A well-lubricated finger should be passed into the rectum on the seventh day after operation, and again every other day until the wounds have healed, in order to prevent excessive contraction. It is often wise to give the patient a metal rectal dilator to pass himself daily for a fortnight or more after leaving hospital.

Post-operative complications.—(1) Reactionary hæmorrhage: this may occur within twenty-four hours of operation. If severe, the patient should be given an anæsthetic and the bleeding point ligatured. If not severe, a piece of rubber tube, with vaseline gauze wrapped round it, should be inserted into the rectum by means of a proctoscope, and left in position for forty-eight hours.

(2) Secondary hæmorrhage: this is usually the result of sepsis and is uncommon. It may occur from seven to ten days after operation. It should be treated by means of a tube wrapped round with vaseline gauze, as mentioned above.

(3) Stricture formation: this is liable to occur after any operation for removal of piles. "Preventive treatment" is of the utmost importance, such as details of operative technique, the passage of a well-lubricated finger a few days after operation, and the systematic use of a metal rectal dilator for some days in the immediate post-operative period.

Reference

Milligan, E. T. C., *et al.* (1937): *Lancet*, 2, 1119.

may be adapted to suit the patient's needs. Furthermore, the effects of stretching from use can be compensated by applying the bandage more firmly. An elastic stocking has a definite place for occasional use, but it needs to be renewed frequently in order to prove satisfactory. The average stocking is either too tight or too loose, and is only suitable for certain cases; it has an advantage over a bandage so far as cosmetic reasons are concerned.

The "two-way stretch" bandage is only suitable for the control of varices associated with gross œdema. The elastic bandage (Bell and Croyden type) offers stronger support than does the bandage supplied by Messrs. Down Bros. It will be seen that care must be exercised in choosing the bandage with the right degree of elasticity for the case under consideration.

The circulation is improved if walking exercise is taken, provided that at the same time elastic support is given to the limbs. So many patients do not appreciate that standing with unsupported legs is detrimental, and that the pumping action on the venous return is improved by muscle movement against an elastic support.

The "Unna paste bandage" is only required for cases of severe varices in which complications are not controlled by the preceding types of support. The proper application of the bandage is essential. Subject to a correct application, it may be worn for as long as a year without renewal. There are obvious disadvantages, however, to this treatment.

(3) *General measures.*—The general health of the patient must receive attention. In the presence of pain, vitamin B appears to be successful in many (Krieg, 1938). The patient's weight needs to be reduced, in a large proportion of cases. Diet and the correct dosage of thyroid may cause much improvement. Flat feet, so frequently encountered in varicose sufferers, also require attention.

INJECTION TREATMENT

The exclusive use of sclerosant injections in the treatment of varices should be limited to a certain group of sufferers. These groups may conveniently be tabulated as follows:—

- (1) All those cases presenting varicose veins in which a valvular competence is present. Such cases may be selected by the application of the tests enumerated on page 299.
- (2) That group of patients who, although suitable for operation, refuse such treatment.
- (3) Those minor cases which require treatment for cosmetic reasons only.
- (4) Cases considered to be poor surgical risks.
- (5) In the localized treatment of some cases of ulceration by means of injection of the feeder veins.

It will be seen that although there is still a definite field for this treatment, it is a strictly limited one. The recurrence rates of such treatment are too well known to need further publicity. However, it is a safe treatment and can always be repeated if necessary. Also, as has been noted by many,

(c) *Arteriosclerotic conditions*.—There is no absolute rule regarding active treatment to varices in a limb with impairment of the arterial blood supply. Obviously, if after careful testing (see p. 299) it is found that the arterial blood supply is materially deficient, too much risk is involved if anything but conservative treatment is advised. Active measures may well produce a disaster, caused either by excessive thrombosis or by infection.

(d) *Deep vein thrombosis*.—A recent history of phlebitis of the deep veins negatives all active treatment to the superficial varices. It should be remembered, however, that evidence of deep vein thrombosis may disappear after a sufficiency of time, and that observation for a period of up to two years may show some evidence of recanalization. A long-standing history of deep vein thrombosis may often be present in a patient with recanalized deep veins. These veins, however, are sometimes hyper-susceptible to the action of sclerosants, and careful testing (see p. 299), followed by cautious treatment, is required for these borderline cases. The practitioner will be wise to treat all these patients by conservative measures until such time as he has the requisite experience.

(e) *Pelvic tumours*.—Conservative methods are indicated until the cause of the mechanical obstruction to the venous flow has been remedied.

The above indications for conservative treatment, with the exception of the last, should not be regarded as rigid rules, as the majority of cases are open to discussion of the "pros and cons" regarding more active treatment.

CONSERVATIVE TREATMENT

(1) *Rest and elevation*.—The legs should be supported on a stool when the patient is sitting. At night the foot of the bed may, with advantage, be raised a few inches on blocks. During pregnancy both preventative and conservative measures include occasional short rests during the day, with the legs elevated. Leg exercises in this position are beneficial.

(2) *Elastic support*.—According to the severity of the varices and to the degree of œdema, so must the type of support be varied. The following are those in common use:—

- Unna plaster
- "Two-way stretch" bandage (Bell and Croyden)
- Elastic bandage (Bell and Croyden)
- Elastic bandage (Messrs. Down Bros.)
- Stockinette tubular bandage (W. H. Bailey and Son)
- Elastic stockings, heavy and light
- Spiral elastic stockings (Bourgeaurd)
- Compri-vena type of stocking support
- Lastonet bandage
- Crêpe bandage

These are the main types of support for practical use, but there are many others for individual cases. Elastic bandages offer a far better support than do elastic stockings, since the tension of the elastic support

may be adapted to suit the patient's needs. Furthermore, the effects of stretching from use can be compensated by applying the bandage more firmly. An elastic stocking has a definite place for occasional use, but it needs to be renewed frequently in order to prove satisfactory. The average stocking is either too tight or too loose, and is only suitable for certain cases; it has an advantage over a bandage so far as cosmetic reasons are concerned.

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- (5) In the localized treatment of some cases of ulceration by means of injection of the feeder veins.

It will be seen that although there is still a definite field for this treatment, it is a strictly limited one. The recurrence rates of such treatment are too well known to need further publicity. However, it is a safe treatment and can always be repeated if necessary. Also, as has been noted by many,

including Faxon (1933), symptoms cease to be so severe after a recanalization of the veins has occurred. The veins may have been rendered thicker and more supportative by means of the sclerotic injections. The practitioner must not, however, confine his therapy exclusively to injections in those patients in whom surgery is indicated, unless he explains the marked risks of recurrence and the relative merits of surgical treatment. The patient should be made to understand that he should report at regular intervals after the injection treatment has been completed, and that he should regard the care of his varices in much the same way as he has been taught to regard the care of his teeth.

OPERATIVE TREATMENT

In the present state of knowledge operative treatment consists mainly in the performance of an efficient resection of the internal saphenous vein, known as a "flush ligation" or "top tie", combined with a meticulously careful ligation of all the main tributaries at the actual site of the junction of the internal saphenous vein with the femoral vein. I have come to consider this operation, in the majority of cases, as being almost a routine antecedent to any subsequent treatment.

There are many and varied techniques in the performance of this operation, but there is one factor common to all methods, which I particularly wish to stress, and that is that "major theatre" technique is essential. Casual surgery of an out-patient nature should be discountenanced (Dodd, 1945). Also the fetish of a minute incision must be discarded. Fatalities, early recurrences and sepsis are not uncommon, and thus the operation should be treated with the respect it deserves.

Recent American statistics (Hodge *et al.*, 1945) show a recurrence rate after this surgical treatment to be a definite entity, and in good hands these American authorities admit as high a rate as 23 per cent., after a comparatively short period of time.

Some operators prefer to inject a sclerosant at the time of operation. Others prefer to divide the "column of blood" at certain selected places between the internal malleolus and fossa ovalis, and to use sclerosants at a subsequent date, if required. It is in the selection of cases for the use of sclerosants *at the time of operation* that most difference of opinion occurs. I prefer to avoid the use of sclerosants in all those cases which have been at some time the subjects of a deep vein thrombosis. I find that good results may be obtained by means of a high resection of the internal saphenous vein, combined with local ligations at selected levels, and that subsequently after a lapse of a few weeks, small doses of sclerosant may be given with a greater safety than would be obtained by means of a massive dosage into an empty vein at the time of operation. It should be noted that much experience is required in marking out the places of incision *before* operation, and that an accurate knowledge is also required concerning the competence or otherwise of the valves of the main vein and of the communicating veins

throughout the leg. As suggested by Dodd (1945), it should be remembered that, when the external saphenous vein only is involved, it is often necessary to deal with the internal saphenous vein at the same time.

The operative treatment of varices by *local ligations* alone, presents but a limited field. An occasional case presents itself in which a high ligation is contraindicated, or in which a large vein in the lower leg has recanalized rapidly after sclerotic treatment. A local ligation under local anæsthesia can then be most helpful.

The *subcuticular ligation* of varices, about which there has been so much recent discussion in the medical journals, is, to my way of thinking, a quite unjustifiable procedure.

The fact that so much argument on the operative treatment of varices is possible, and that the very presence of so many varying techniques occurs, will serve to demonstrate to the reader that the ideal treatment has not yet been achieved. There is still no "100 per cent. cure of varices". The recurrence rate still stalks the enthusiast and the vagaries of the varix are still a source of trial and annoyance!

TESTS FOR DETERMINING THE STATE OF VENOUS COMPETENCE

The selection of cases for the conservative, sclerotic or operative groups resolves itself into a consideration of the factors already discussed, added to a proper evaluation of certain tests. As will readily be appreciated, the selection of cases for the choice between the operative or "operative-sclerotic" groups is a matter of personal preference, and one in which there is but little agreement.

The various pathological conditions in both the deep and superficial systems must be determined by means of the evaluation of tests which should result in giving the following information on (a) the competence of the valves of the internal saphenous vein; (b) the competence of the valves of the communicating veins; (c) the presence or absence of thrombosis in the communicating veins; (d) the patency of the deep venous circulation.

The common tests in present-day use are:—

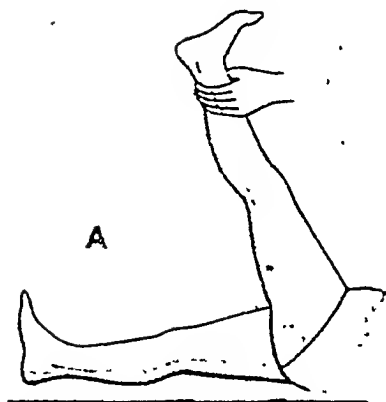
- (1) The Trendelenburg test
- (2) Perthes's test
- (3) The Ochsner-Mahorner test
- (4) The double tourniquet test

(1) *The Trendelenburg test*.—It will be seen that this test, also known as the Brodie-Trendelenburg test (fig. 1), is a method for the determination of the competence of the valves of the internal saphenous vein, as well as an approximate guide to the condition of the communicating veins. The test is not sufficiently "localizing" in practice, but it is useful if the venous valves are proved to be competent, since surgical intervention is then contraindicated.

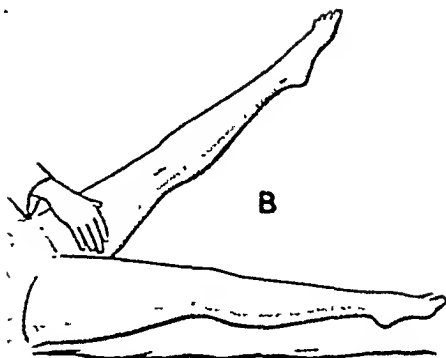
(2) *Perthes's test* (fig. 2).—This test will serve to demonstrate the patency of the deep veins at the level at which the tourniquet constricts the superficial system.

A tourniquet is applied to the middle of the thigh. On walking, the veins become more prominent, showing that there is some obstruction to the deep system. An

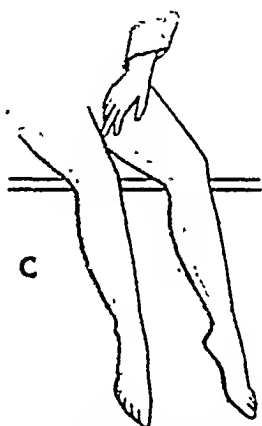
FIG. 1.—THE "BRODIE-TRENDLENBURG" TEST.



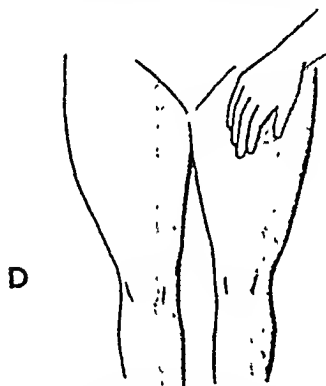
A. The patient is recumbent and the veins are emptied by raising the limb.



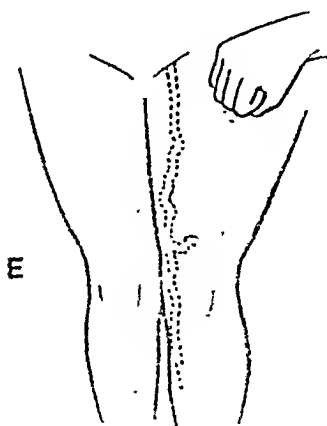
B. Pressure over the termination of the internal saphenous vein is applied.



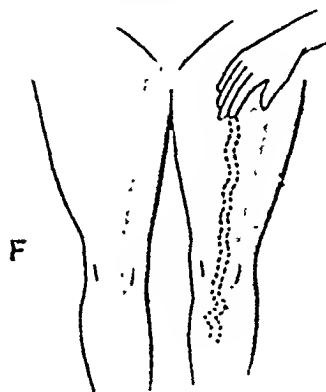
C. The patient sits whilst the pressure is maintained.



D. Pressure is kept up with the patient standing.



E. The digital pressure is released. Rapid filling of the vein from above indicates valve incompetency.



F. The test is repeated, with the difference that the pressure is not removed from the region of the foramen ovale for at least thirty seconds. Filling of the veins during this time suggests an incompetency of the communicating veins connecting the deep and superficial systems. Such combined findings are referred to as a "doubly positive reaction".

improvement in the condition of the varices after exercise will demonstrate the converse, showing that the communicating veins between the two systems are not thrombosed, and that the blood is able to return *via* the deep system.

(3) *The comparative tourniquet test (Oschner and Mahorner).*—This test is probably the most valuable, since it gives information regarding the condition of the deep veins, communicating veins and internal saphenous vein at various levels. The patient's varices are inspected under five conditions:—(a) Standing; (b) walking with no tourniquet; (c) tourniquet applied at the upper third of the thigh whilst walking; (d) tourniquet applied around the middle third of the thigh whilst walking, and (e) tourniquet applied around the lower third of the thigh whilst walking.

The condition of the varices *below* the tourniquet is all that has to be considered. When the tourniquet is below the lowest communicating vein in which the valves are incompetent, the distension of the veins becomes less when the patient moves about. The authors of this test divide their findings into various grades. "Grade 4 improvement" is a term they use when the vein disappears entirely on exertion, whereas "Grade 1 improvement" implies there is only slight improvement. The changes are recorded for each of the various levels at which the tourniquet has been applied.

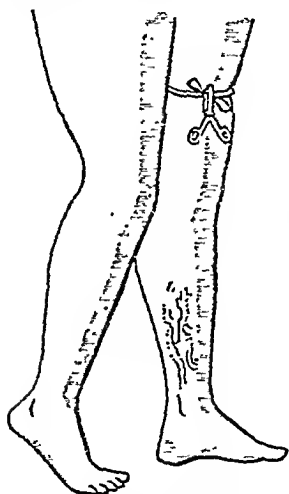


FIG. 2.—Perthes's test.

(4) *The double tourniquet test.*—Apply a tourniquet above and below a large group of veins. The application must be sufficiently firm to occlude the superficial system only. With the patient lying down, elevate the leg and note whether the superficial veins empty into the deep system. Similarly, note whether exercise causes distension of the superficial veins, indicating a thrombosis of the deep system.

In addition to these tests, in many cases it is advisable to make additional investigations into the condition of the *arterial blood supply of the limb*. For practical use the following tests are recommended:—

- (1) Checking the pulse of the dorsalis pedis artery
- (2) Oscillometric readings
- (3) The histamine test of De Takats and Quint
- (4) The Samuel test

As a rule the first of these three tests is the only one necessary from a practical point of view, the others being reserved for doubtful cases.

In performing the *histamine test*, the skin of the foot is scarified through a drop of 1 in 1,000 histamine phosphate in normal saline. If a red wheal occurs within five minutes of this manoeuvre, vasodilatation

is present and an effective arterial blood supply is operating in the limb.

By the *Samuel test*, thromboangitis obliterans (Buerger's disease) may be detected. With the patient in a recumbent position, both legs are elevated to an angle of 90°. The patient should then rapidly flex and extend both feet. If the plantar surfaces of the feet fade from a normal pink to a marked pallor, the arteries are occluded. By palpating the pulsations of the arteries in the foot and leg, this test may be further checked.

It will be seen that a proper evaluation of these tests, taken into conjunction with the other factors already mentioned, is all that is needed in order to place the patient into one of the three groups for treatment.

Before leaving this superficial survey of the present-day problems in the treatment of uncomplicated varices, I should like to add a few words of warning.

(1) There is no 100 per cent. cure for varicose veins. Therefore never promise your patient too much. Be guarded in your prognosis.

(2) The operation of high resection should be treated with the respect which it deserves. Avoid out-patient technique and remember that it can be a difficult operation in many cases.

(3) When using sclerosing therapy, lithocaine and an empty vein technique produce good results in the hands of many. The "twin-injection" method is valuable for large resistant varices.

(4) Remember the varied methods of support available under "conservative measures", and treat the patient as well as the legs.

(5) Examine your patient thoroughly and so avoid missing conditions such as cardiac and nephritic oedema, which may have been attributed to the varices only. Remember that pelvic tumours may be present.

THE COMPLICATIONS OF VARICES

It has already been stated that many complications would never occur if the practitioner were sufficiently careful regarding his patients' varices in their earlier stages. Everyday problems may commonly be associated with (1) ulcers, (2) eczema, and (3) phlebitis.

VARICOSE ULCERATION

The first of the everyday problems for the consideration of the practitioner is to be quite sure of the correct diagnosis. If the ulcer is not in the varicose



FIG. 3.—The sites of varicose ulceration. Ulcers occurring above these areas are not due to a gravitational cause. This is a point of importance when conserving the differential diagnosis (from Foote's "Varicose Veins, Hemorrhoids, etc.", H. K. Lewis and Co., Ltd.).

ulcer area (fig. 3), he may be quite sure that there are other factors causing this ulcer and that the varicose veins are of secondary importance. He must always be aware that the following conditions are by no means rare:—(a) Mycotic ulcers; (b) syphilitic ulcers, and (c) factitious ulcers.

The varicose patient is especially susceptible to *mycotic ulceration*, which is often associated with *tinca interdigitalis*. These ulcers first appear as irritable blisters, which, after secondary infection, burst and produce a ringworm arrangement of ulceration.

The *syphilitic ulcers* are usually multiple and sometimes serpiginous. A general examination of the patient may give further clues to the diagnosis, and all doubtful cases should be submitted to a blood test.

Factitious ulcers are associated with hysteria and evidence of this state should be looked for.

Malignant ulcers must never be forgotten. When in doubt, a biopsy is essential.

TREATMENT.—Having made a careful diagnosis, the real problem must now be faced regarding treatment. In the main, patients with varicose ulceration may be divided into two groups:—(1) Those in whom supportive measures *only* are indicated, and (2) those requiring surgical and/or injection treatment in addition to supportive measures.

The exclusive use of supportive measures is reserved for those cases in which a severe degree of deep-vein thrombosis is present, or in those cases in which there is an associated insufficient arterial blood supply.

Operative measures directed towards the obliteration of the saphenous systems is required in all cases in which there is an associated incompetency of the valves of the internal saphenous vein. It should be noted that most cases of varicose ulceration can be healed by means of supportive measures *only*. The ulcers do not remain healed, however, unless the support is continued indefinitely. It is for this reason that a high resection of the internal saphenous vein is a usual associated necessity. Again, an ulcer may heal with a thin paper-like scar. Such cases require a skin-graft. The technique of such treatment is outside the scope of the everyday problems under discussion. The recommendation of surgery for the second group of patients should not be delayed too long. It is as well, however, to clean up the ulcer by means of supportive treatment and dressings before an operation is performed.

The majority of practitioners will be more concerned with the *supportive treatment* than with the operative, and it will be as well to enumerate some of the facilities available for use. These are:—

- (1) The two-way stretch elastic treatment bandage (Bell and Croyden)
- (2) The elastoplast bandage
- (3) The Unna dressing
- (4) The ceraban bandage (Cuxson, Gerrard and Co.)
- (5) The elastocrêpe diachylon bandage (Smith and Nephew)
- (6) The viscopaste bandage (Smith and Nephew)
- (7) The ichthyo-paste bandage (Smith and Nephew)
- (8) Plaster of Paris
- (9) Pressure pads, elephant felt, sorbo rubber, marine or rubber sponge

I have placed the *two-way stretch elastic treatment bandage* at the top of the list, for it has so many advantages over the elastoplast type of bandage, i.e., (a) it is removed at night; (b) it may be removed for a bath; (c) no risk of acute allergy is present; (d) it allows for a daily inspection of the ulcer, and (e) dressing and medicaments may be used under the bandage as required.

The *elastoplast* bandage is still a valuable friend, but its correct application

is essential. As in the case of the *Unna dressing*, this technique can only be learned from a practical demonstration.

The *ceraban bandage* and also the diachylon elastocrêpe are less supportive than the elastoplast, but have the advantage of rarely producing a dermatitis from allergy. The main constituents are lead plaster, colophony, and soap. There is no need to do a "patch" test before applying the bandage, although this is advisable when using the elastoplast bandage (fig. 4).

The *viscopaste bandage* is a convenient method of applying a *Unna dressing*. It does not, however, give such a good support as does a correctly applied gauze bandage soaked in *Unna paste*.

The *ichthyopaste bandage* has its place in the treatment of ulceration associated with eczema, but I find it is rarely required.

The *plaster of Paris cast* is useful when employed in cases of very painful ulcers around the ankle. Once the pain is controlled an alternative method of support should be recommended.

Pressure pads of various types are needed to flatten out the œdematous lips of certain ulcers. Again practical experience in their method of application is required.

The basis of all treatment is the emptying from the lower leg of œdema and the prevention of its recurrence, when possible, by means of surgery and/or injection treatment. Varicose ulceration should become a much rarer disease if the practitioner, understanding the pathology of the condition, is prepared to give time to the subject.

Local applications to varicose ulcers are of much less importance. I use sulphathiazole, gentian violet, penicillin cream, cod-liver oil and proflavine sulphate in certain cases.



FIG. 4.—Allergy to elastoplast.

VARICOSE ECZEMA

Here, once again, the cause must be dealt with, and many cases should be referred for a "high resection" or for injection treatment. The *local treatment* consists in applying a suitable medicament, covering this with a crêpe bandage, and finally giving the leg the necessary support by means of an elastic bandage. In this way the elastic bandage is not soiled by

ointment, and the elasticity is not impaired as a result. As a routine local application I find crude coal tar, in combination with zinc oxide and

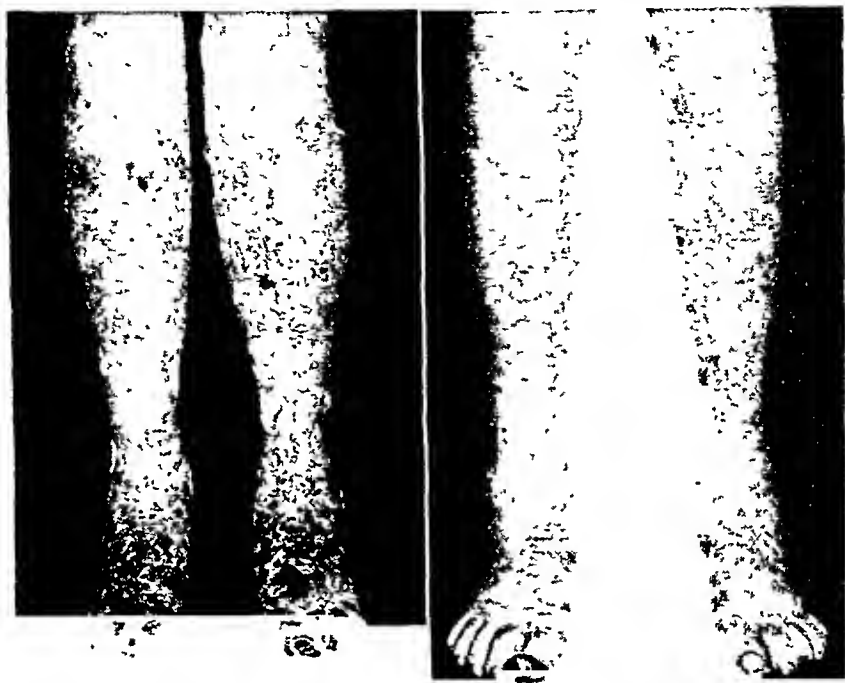


FIG. 5.—A. Varicose eczema. B. After fourteen days' treatment with crude tar ointment. This case is now ready for a "high resection" operation.

lanoline, to be valuable (see fig. 5). Some cases may require a calamine or astringent application. Gentian violet, 2 per cent. in water, still has a place in treatment.

PHLEBITIS

The problem of phlebitis is still one which seems to give the practitioner most trouble. I see cases frequently in which the patient has been hurried to bed and told to be as still as possible in case the clots move! This treatment occurs some twenty years after the original, and since then oft-repeated, advice of Dickson Wright and others regarding the dangers of such treatment, and it should be unnecessary to emphasize that *in all cases of superficial thrombophlebitis associated with varices, ambulatory measures are essential*, so that a continuance of the process of thrombosis may be arrested.

A pad over the fossa ovalis, a firm elastoplast bandage from the toes to the groin, and ambulatory treatment, are all the measures that are needed in most cases. In addition, many patients will benefit from the concomitant administration of sulphadiazine. During the past few years it has become evident that this line of treatment may still further be improved upon, if a "high resection" is performed on the onset of symptoms. Provided the internal saphenous vein is normal in the upper third of the groin, this is the treatment *par excellence*. The symptoms are apt to disappear quite miraculously (Heyerdale *et al.*, 1943). The appreciation of this point will remove a further problem for the practitioner, and I feel that in time this operation may become a routine emergency.

Deep vein thrombophlebitis.—In the case of a phlebitis involving the deep veins, it is necessary to keep the patient in bed until the acute symptoms have abated. The administration of sulphadiazine in full doses is advantageous. Many authorities claim that a parasympathetic block should be performed as a routine emergency operation.

There is no doubt that dicoumarol therapy is of value, provided an adequate check can be made daily of the blood-clotting time of the patient's blood. Without this precaution there is considerable danger to the sufferer.

CONCLUSION

The more the subject of varices is studied, the more numerous are the problems which present themselves. I can but apologize for a quite cursory summary of some of the more troublesome everyday problems, and once again call attention to the essentially dogmatic statements in the text, which are inevitable within the scope of this article. The problem of the varix is still not properly solved, and its wayward wanderings will continue to annoy and fascinate the enthusiast.

I am indebted to Messrs. Ilford, Ltd., for the photographs and to the Editor of the *Post-graduate Medical Journal* for permission to use the diagrams for fig. 1 and 2.

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THE EARLY RECOGNITION OF DISEASE

IV.—DIGESTIVE DISORDERS

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AMONG the many symptoms of impending or existing digestive disorder, soreness of the mouth, usually, although not invariably, limited to the tongue, may prove one of the most baffling. It may be the first symptom of systemic disease. With dental disease, and with the more obvious causes, e.g. ulceration in various forms, I shall not deal. It is the sore mouth with scanty signs which merits attention.

THE SORE MOUTH

Soreness at or near the tip of the tongue is usually due to smoking, or to drinking fluids whilst they are too hot. Although both habits are likely to have been of long duration, yet the soreness tends to occur in attacks lasting for about two weeks and then to disappear completely, only to recur in a few months. When smoking is concerned it is often found that a rawness of the tip of the tongue was noticed the day after an evening of very heavy indulgence, or that it has arisen shortly after changing to a new brand of tobacco. The affected area is red and clean, the papillæ are unduly prominent, and the tip of the tongue is acutely tender to touch and exquisitely sensitive to tobacco smoke. Abstention from tobacco results in subsidence of soreness in a few days. Smoking in moderation can be resumed without hurt; if the habit be freely indulged, especially in the form of cigarettes, the trouble will return and may spread over a greater area of the tongue. It may ultimately pave the way for a chronic streptococcal glossitis. The drinking of hot tea is a commoner cause of this type of tongue than is smoking. It is met with in the restless, forever busy man or woman who bolts food and resents waiting for the tea to cool down to a temperature fit for consumption. Once the soreness is established the tongue becomes extremely sensitive to thermal stimuli, whether hot or cold. Again the cure lies in avoidance of the cause, but these people are temperamentally incapable of such control for more than a few weeks after restoration of comfort.

Diffuse soreness of the tongue and often of the buccal aspect of the cheeks, with no visible changes, is distressingly common in middle-aged women. The patient presents a picture of misery, not only on account of the ever-present discomfort, but yet more because she is firmly convinced she has cancer. Although many of these women are psychoneurotics whose cure depends upon an understanding of the underlying mental disturbances, others owe the symptom to the menopause. It is difficult to distinguish one group from the other without therapeutic trial, for if there be changes to be seen in the tongue they are usually due solely to the repeated rubbing

of the tongue against the teeth in an attempt to alleviate distress or to probe for suspected growth. If the symptom occurs within five years of the menopause the administration of stilbæstrol should be tried, in doses of $\frac{1}{2}$ mgm. daily. If benefit is to follow, it will be evident within four weeks.

Attacks of soreness of the tongue, occasionally associated with diffuse soreness of the throat, in the middle-aged or elderly should raise a suspicion of pernicious anæmia or of achlorhydric microcytic anæmia. They are more common in the former. In both instances the tongue is completely clean—pathologically free from fur, and in the first year there is often nothing else worthy of remark. Later, streaky atrophy and pallor may be seen on the dorsum of the anterior part of the tongue, but this is a relatively late sign. A blood count is essential to early recognition of the disease and it must include measurement of red cell diameter. Countless mistakes are made in assessing the nature of an anæmia by relying on the colour index.

An abnormally clean tongue which is painful may also be seen in the absence of anæmia and when the only abnormality is gross hyperchlorhydria. This is not common, but whereas the appearance of mucosal atrophy is almost always a sign of achlorhydria, in its absence only a fractional test meal can be relied upon to show whether gastric acidity is excessive or lacking. The complaint of "acidity" or of heartburn is equally common to those with hyper-acid, normal, and achlorhydric stomachs.

Soreness and redness on one side of the tongue, especially in women, may be due to pyogenic infection of the parotid gland. Recurrent swelling of the face, tenderness of the parotid gland, pus cells and organisms in the saliva collected from the duct will serve to clinch the diagnosis. Repeated massage and diathermy may arrest the disease. Another important affection of the mouth is the therapeutically induced disease of *gold poisoning*. One of the first signs of reaching the limit of tolerance to this metal is soreness of the tongue and gums, often with abnormal cleanness of the tongue. This is a danger signal demanding cessation of treatment. To disregard it is to invite catastrophe.

DYSPHAGIA

The sensation that food is sticking in some part of the gullet, even more than soreness of the tongue, again evokes fear of cancer—and with greater justification. The position of the hold-up is fairly accurately localized and is of some help in diagnosis. The "lump in the throat" is usually indicative of hysteria, the Plummer-Vinson syndrome, or œsophagitis. Radiological investigation is of help here only in a negative sense. The *Plummer-Vinson syndrome* can be recognized by the anæmia, atrophied lingual mucosa, flattened nails and possibly splenomegaly. Achlorhydria is present. If treated with iron in the early stages the symptom will subside. *Hysteria* may be easily recognizable; on the other hand it may be difficult to distinguish from *catarrhal œsophagitis*. In fact, the dysphagia of the latter is frequently perpetuated as an hysterical symptom when the physical basis of its appearance has passed away. Oesophagitis of this type usually follows a heavy cold

with sore throat or an attack of influenza. There is pain as well as a sensation of obstruction on swallowing. Provided that no irritants, such as mustard, vinegar, spiced food, hot drinks and alcohol, be taken, the inflammation almost always subsides in two weeks. A feeling of obstruction deep to the lower end of the sternum before the age of forty is probably due to *achalasia of the cardia*. After this age it may be due to achalasia or carcinoma. Both are usually painless at first, whereas simple ulcers of the œsophagus cause pain on swallowing and at certain other times, notably on stooping.

Achalasia rarely produces persistent dysphagia: there are remissions of several weeks or months in the first two years. The difficulty in swallowing is equal for solids and liquids. The characteristics of *carcinoma* are the opposite of the above. This is a general guide, but exceptions abound. Radiology is an essential for early diagnosis and it should be entrusted to the expert only. Although achalasia can usually be recognized by even the inexperienced radiologist, and confirmed by the appearances on the plate, carcinoma is often completely missed. The former produces a closure of the distal end of the œsophagus which gives rise to a symmetrical cone-shaped end. I have elsewhere pointed out that in the early stages the cardia can be opened promptly by the inhalation of amyl nitrite. Carcinoma will allow a barium meal to flow readily into the stomach, and only in the late stages will gross irregularity of the œsophagus be manifest. If capsules of barium sulphate, or wool soaked in the emulsion, be swallowed, delay in passage at the point of disease may be demonstrated. Of greater importance is the fact that the X-ray examination should be made when the patient is lying down. A small amount of barium emulsion should then be swallowed. This will adhere to the walls sufficiently to allow demonstration of the mucosal pattern. In the plate thus produced, the signs of growth may be detected long before they could be apparent by using the ordinary "barium-swallow" with the patient erect. The same technique, followed by a larger amount of barium, and X-ray in the Trendelenburg position, are necessary to show an *œsophageal peptic ulcer* and the usually associated congenitally short œsophagus. Oesophagoscopy should always be used if doubt about diagnosis persists in spite of the above investigations.

BLEEDING FROM THE STOMACH OR INTESTINES

Hæmatemesis of half-a-pint or more is likely to be due to *gastric or duodenal ulcer*. The two cannot be differentiated by the route through which the bleeding first manifests itself. Gross gastric hæmorrhage may also be the first presenting symptom of *uræmia*. Although it is true that the renal disease is necessarily far advanced at this stage, cases do occur in which the patient is first brought under medical supervision because of hæmatemesis. The cause of the bleeding is a diffuse gastritis with multiple acute ulcers. Drowsiness out of proportion to blood loss, a thickly furred tongue, and cardiovascular changes should at once give rise to suspicion. A large hæmatemesis is so rarely due to carcinoma of the stomach that its absence

can with some confidence be assured. The same applies to *melæna*.

Both *hæmatemesis* and *melæna* may be due to *cirrhosis of the liver*, but it is a mistake to assume that they are necessarily the result of ruptured *œsophageal varices*. The gastric mucosa and that of the intestines are highly congested in this condition and slight trauma may produce ulceration and brisk hæmorrhage. The point is important prognostically, for the outlook for the patient who has over-burdened anastomoses is already gloomy, whilst in the stage of general congestion of the alimentary tract there is a real possibility of full recovery of health. It is now often possible to demonstrate *œsophageal varices* radiographically. Failing this, *œsophagoscopy* should be used, although with the greatest caution.

Non-ulcerative hæmatemesis.—A puzzling group of patients presenting hæmatemesis and/or *melæna*, with constitutional signs of severe blood loss, has been attracting much attention since the introduction of the gastroscop. In former years they were dubbed examples of *gastrostaxis* or, more often, of gastric ulcer. The characteristic of these people is that there has been no indigestion before the sudden hæmorrhage. Furthermore, they recover remarkably rapidly, usually without blood transfusion. A frank *melæna* is replaced by normal stools in a few days, and the *anæmia* is for a matter of a few weeks only. X-rays taken within a week of the hæmorrhage fail to reveal an ulcer. Gastroscopy undertaken within a few days often shows multiple submucous hæmorrhages and one or many acute small gastric erosions. Within a month of the attack the mucosa may look normal. What noxious influence, or influences, has been responsible for these attacks which tend to recur in a proportion of these patients is still not known. I drew attention to this non-ulcerative hæmatemesis some years ago and suggested that one cause was the irritant action of aspirin. Later, Lintott and I confirmed this view by observing the effect of aspirin particles on the gastric mucosa. Although, in the majority of persons, some degree of irritation is exerted by the drug, the intensity varies considerably. Therefore it may well be that many other substances in common use are liable to inflame the mucosa, and under suitable conditions cause bleeding. Detailed inquiry in relation to drugs, food and drink taken within twenty-four hours of the bleeding, may assist discovery of the cause and prevent recurrence.

In reference to the passage of *red blood from the bowel*, I shall content myself with one observation, and that an important one. It is that the passage of blood is not a symptom of *diverticulitis*. No matter what the radiologist may report, if blood is passed *per anum* there is some other cause. If the blood spurts out during defæcation, piles are present. If small amounts with or without fæces or mucus are seen, growth is the probability. To pass a sigmoidoscope before passing the finger into the rectum is a modern absurdity encountered only too often. To perform a digital examination without a visual inspection is even more common and reprehensible. I have known this to lead to sigmoidoscopy and a bariun enema to trace bleeding which was in fact due to hæmorrhoids.

PEPTIC ULCER

The early recognition of the development of gastric or of duodenal ulcer depends upon appréciation of the significance of the associated pain and its rhythm. Although the pain is usually epigastric, it may be felt only in the sub-umbilical region, retrosternally, in the præcordium, or in the interscapular region. Pain reference to these points in the absence of epigastric pain is admittedly rare, but it does occur. It is therefore the pain-rhythm which deserves the closest analysis. The feature constant to both types of ulcer is that there are always remissions of weeks or months separating the earlier bouts of pain; for example, a pain which started two years ago and has been felt every day is never due to gastric or duodenal ulcer.

Differential diagnosis.—As to the actual timing of the pain from day to day, this varies so much in gastric ulcer that it may often lead to a conclusion that the ulcer is in the duodenum. Pain soon after food, e.g., within half an hour, usually means gastric ulcer, and yet relief of pain by food is described so often by patients with ulceration of the stomach that this feature cannot be relied upon as indicating duodenal ulcer. Even the pain of carcinoma of the stomach and the discomfort of gall-stone dyspepsia may behave as if the source were duodenal ulcer. Pain which disturbs sleep in the early hours is duodenal, but many patients with duodenal ulcer sleep throughout the night. Certain signs help to differentiate the two types of ulcer. Localized tenderness high in the epigastrium and to the left of the mid-line is usually found with gastric ulcer. Complete absence of tenderness or slight discomfort to pressure over the upper right rectus is the rule with duodenal ulcer. The fractional test meal of gastric ulcer is indistinguishable from the normal. That of duodenal ulcer shows a highly acid resting juice and a rapid excessive climb of the acid curve, with quick emptying of the stomach. Blood visible to the naked eye in the majority of specimens nearly always indicates carcinoma. As a rule, achlorhydria and a high total acidity are present in these cases.

A competent radiologist is usually able to demonstrate a gastric ulcer quite early in its history. Duodenal ulcer, on the other hand, often eludes the most careful search. Nevertheless, initial pylorospasm, excessive peristalsis and recurrent duodenal spasm are commonly seen.

This observation leads me naturally to a point of fundamental importance: that if symptoms of peptic ulcer are presented, and if there are no other symptoms to throw doubt on the diagnosis, then the patient should be treated for ulceration even if the X-ray is negative. So many men, within a few weeks of their first abdominal pain and within a few days of reassurance by a radiologist, have suffered perforation or hæmorrhage. On the advice I have given it is clear that a few mistakes will be made, but these mistakes do not involve the patient in danger. A small proportion of persons with ulcer symptoms and no signs consists chiefly of psychoneurotics. As rest in bed in ulcer cases invariably produces relief, partial or complete, within ten days, it is of considerable value as a therapeutic test. The psychoneurotic

can always be weeded out because his pain will continue unabated.

Prevention of relapse.—The largest field of failure in gastro-enterology is inability to prevent recurrence of duodenal ulceration. It is not germane to this article to discuss the therapeutic steps best devised to prevent such relapse; but early recognition of the symptoms is clearly of the utmost importance if success is to be obtained in reducing the number of sufferers from chronic ulceration. The most important warnings of an approaching relapse are:—(1) A feeling of exhaustion, inability to concentrate, and bad temper towards the end of the morning, all of which disappear as if by magic within half an hour of eating luncheon. (2) Waking in the early hours of the morning, e.g. 3 to 4 a.m., in a person who normally sleeps soundly. This applies only to the patients who in a previous attack of duodenal ulceration had night pain, i.e., the majority. It will be noticed that I have written nothing about early pain. The omission is deliberate because of a desire to emphasize that the reappearance of pain usually follows the above warning symptoms by an interval of one to four weeks. None of these symptoms would justify the diagnosis of duodenal ulcer in a previously healthy person, but they are of the utmost value in enabling the patient to recognize recurrence at a stage when response to treatment will be prompt and complete. They are in my opinion entirely the result of disturbance of the neuromuscular mechanism concerned with peristalsis which precedes actual ulceration, often for many months. If this view be accepted it will be conceded that too much time has been spent in attempts to combat gastric acidity and too little in controlling the nervous impulses which lay the foundation of duodenal ulceration. At the best, antacids reduce acidity for a short time only, usually less than an hour. The inhibition of noxious impulses can be achieved with adequate doses of belladonna alkaloids, preferably combined with phenobarbitone.

THE LIVER

Space will not allow me to do more than mention one affection of the liver which if recognized early can be cured. This is alcoholic hepatitis. The disease occurs in bouts, the outbreaks coinciding with periods of national prosperity, or in war time with the influx of wealth into the hands of the manufacturing community. The symptoms are those commonly attributed to gastritis, although on doubtful grounds. They are loss of appetite, especially in the morning, loss of weight, lassitude, morning nausea and possibly vomiting, foul taste and furred tongue, epigastric burning, heaviness or distension.

There are two signs, namely, a tender liver edge, usually felt about 1 inch below the costal margin, and pyrexia. The latter may be very intermittent, or noticeable only in the late afternoon. In degree it seldom exceeds 100° F. Sometimes it is more pronounced and is the presenting symptom: a point worth remembering in relation to cryptic fever. The patients are always spirit drinkers and seldom drunkards. The diagnosis horrifies them. Following the logical treatment all symptoms and signs disappear.

REVISION CORNER

It is proposed each month to include short articles in this section, in which experts will summarize modern treatment and clinical procedures, particularly for the benefit of general practitioners who have returned from the Forces. Suggestions for suitable subjects will be welcomed.

PREVENTIVE INOCULATION AGAINST INFECTIOUS DISEASE IN CHILDHOOD

THREE common infectious diseases in this country are a potential danger in childhood and each gives rise to a considerable mortality rate for children under five years of age. They are diphtheria, whooping-cough and measles. Success of preventive inoculation against diphtheria has been demonstrated amply by results, whereas, preventive methods in the case of whooping-cough and measles are more controversial.

DIPHTHERIA

Indications.—Active immunization should be advised for all children from the age of nine months upwards and every child should be treated by the first birthday. There are no contraindications save acute illness.

Method of immunization.—Alum precipitated toxoid (A.P.T.) is the most satisfactory preparation available. Two injections are given subcutaneously. The primary stimulating dose of 0.2 c.cm. is followed after an interval of one month by a second dose of 0.5 c.cm. Occasional reactions are observed, such as local redness, heat and tenderness around the site of the injection, with general malaise and moderate pyrexia. No reaction is common in children under seven years. With increasing age, reactions are more frequently observed, and for those over seven it is well to give 0.1 c.cm. of A.P.T. for the first dose and, if there is no reaction, 0.5 c.cm. is given one month later. All over fourteen years, and any who react to the first dose of A.P.T., should be immunized by toxoid antitoxin floccules (T.A.F.). This preparation shows a low percentage of reactions, even in adults. Three injections of T.A.F. are required at intervals of two or three weeks. The dose is 1 c.cm. for each injection.

TABLE I
METHOD OF DIPHTHERIA IMMUNIZATION

Age	Preparation	Number of injections and dose	Interval between injections
9 months to 7 years	A.P.T.	2 injections: 1st 0.2 c.cm. 2nd 0.5 c.cm.	4 weeks
7 to 14 years	A.P.T.	2 injections: 1st 0.1 c.cm. 2nd 0.5 c.cm.	4 weeks
14 upwards + reactors	T.A.F.	3 injections: 1 c.cm. each	2 or 3 weeks

Occasionally it may be an urgent matter to protect children who have been exposed to a known source of infection. Active immunization takes a period of time to develop, but a passive immunity, lasting for approximately three weeks, may be ensured by administering 500 units of diphtheria antitoxin immediately after exposure. At the same time, active immunization, using the appropriate doses of A.P.T., should be started together with the antitoxin, so as to secure a permanent immunity.

WHOOPIING-COUGH

Indications.—Providing there is a satisfactory method of prevention, it is desirable that children should be protected against whooping-cough as early as possible, because it is often a fatal disease in children under one year.

Method of immunization.—The present method of preventive inoculation relies upon the use of a vaccine. American authorities in general report favourably on whooping-cough vaccines, whereas experience in this country has been by no means so satisfactory. The vaccine should be given as soon as practicable after the age of six months and before exposure to infection. It will be of no use as a preventive once the infant has become infected as the result of contact. Immunity probably takes three months to develop after the final dose of the vaccine.

The strength and dosage of vaccine vary considerably. Reactions, of some degree of severity, are not uncommon following the use of whooping-cough vaccines. Such reactions are of the usual type with local signs accompanied by general symptoms of pyrexia (101° F. to 103° F.) and malaise. The higher dosage given in table 2 below is likely to give the most satisfactory results, but reactions tend to be more frequent with high dosages.

TABLE 2

Strength of vaccine	Number of injections	Dosage of vaccine in injection	Total dosage in millions of organisms	Time interval between injections
20,000 million organisms per c.cm.	4	1st, 2nd and 3rd—1 c.cm.; 4th—2 c.cm.	100,000	1 week between 1st, 2nd and 3rd; 4 weeks between 3rd and 4th
20,000 million organisms per c.cm.	2	1st and 2nd—1 c.cm.	40,000	4 weeks between 1st and 2nd
5,000 million organisms per c.cm.	4	1st, 2nd, 3rd and 4th—1 c.cm.	20,000	1 week between 1st, 2nd and 3rd; 4 weeks between 3rd and 4th

MEASLES

Indications.—Measles is a grave infection in children under five years and is especially liable to complications. Unfortunately there are no practical methods of stimulating active immunity, apart from infection, but passive immunization is now increasingly practised. The passive immunity is temporary and lapses after approximately three weeks.

Method of immunization.—The serum of a patient convalescent after measles, possesses specific antiviral properties which will protect a second individual against infection. To secure complete protection, convalescent serum must be given within five days after exposure to infection. Given between the sixth and ninth day after exposure, a modified or attenuated form of measles is likely to be the result.

As a high proportion of adults have had measles in childhood their serum also contains antiviral properties, but not in such a concentrated form as in a convalescent serum. Refined globulin extracts from the human placenta have a similar protective factor, and recently a specific fraction of globulin, known as gamma globulin, obtained from blood proteins, has been found to be particularly active and shows great promise for the future.

TABLE 3
THE METHOD OF ADMINISTRATION OF THESE PRODUCTS
Dosage of anti-measles products

Product	Minimum dose for 3 years and under	Dosage factor over 3 years	Object desired	
			Protection	Attenuation
Convalescent serum	5 c.cm.	Age \times 2 in c.cm.	1st to 5th day	6th to 9th day
Adult serum	10 c.cm.	Age \times 4 in c.cm.	"	"
Placental extract	4 c.cm.	Age \times 3 in c.cm.	"	"
Gamma globulin	2 c.cm.	—	"	"

To explain table 3, some examples may be mentioned. The minimum dose of convalescent serum is 5 c.cm., and this would be given to a child of three years or under, whereas a child of six would be given a dose calculated by taking the age and multiplying by the dosage factor. The dosage factor for convalescent serum is two. A dose of more than 40 c.cm. of any type of sera is not advised, on account of bulk.

Attenuation may also be obtained by giving one-half of the dose required for complete protection during the first five days of the incubation period.

Results to be anticipated.—Complete protection may be expected in approximately 70 per cent. of cases when the exact date of exposure is known. Attenuation will probably be effected in some 35 per cent. when this is the objective. Attenuation is exemplified by (1) a prolonged incubation period, (2) slight catarrhal stage, sparse rash often pinker than usual, and slight to moderate pyrexia; (3) complications are infrequent; (4) an attenuated attack should confer lasting immunity.

W. POWELL PHILLIPS, O.B.E., M.R.C.S., L.R.C.P., D.P.H.

TREATMENT OF DIARRHŒA AND VOMITING IN INFANCY

DIARRHŒA and vomiting are symptoms. In infants they arise from a greater range of causes than is the case with older patients. Ideally, the first step in treatment would be to find the origin of gastro-enteritis in each patient and to attempt to remedy the basic defect. Unfortunately this is often impracticable, either because the patient's condition is so grave that symptomatic treatment has to take precedence of any investigation or, when the primary affection is of the gut, because the infecting organism cannot be identified. Treatment must therefore be summarized in the following order:—

(1) *Symptomatic treatment.*—Similar to that of shock, the condition which a severe case of diarrhœa and vomiting resembles:—

- (a) Rest
- (b) Warmth
- (c) Fluids
- (d) Cardiovascular stimulants

By rest is meant freedom from all but the bare minimum of nursing attention, and planning all therapy so that it may be carried out while the patient sleeps.

Warmth is provided by the raising of the room temperature in preference to the use of hot-water bottles or electric blankets.

The administration of fluids calls for judgement and some practical experience. Oral and rectal routes are ordinarily ruled out by the nature of the complaint. Fluid is given either subcutaneously or intravenously. The subcutaneous route is simple in its apparatus and technique. Against this is the small amount of water which can be given and the fact that it must be given as physiological saline, glucose being too irritating to put under the skin. In a severe case, fluid must be given intravenously. For those who are not constantly treating babies it is right to cut down on a vein of the ankle or, when these are exhausted, the antecubital fossa. Among the commonly used infusions are the following:—

<i>Fluid</i>	<i>Advantages</i>	<i>Disadvantages</i>
Physiological saline	Availability	Risk of œdema by adding electrolytes to already concentrated blood
Dextrose solution 5 or 10 per cent. in water, or 4 per cent. dextrose in 0.18 per cent. saline	Diuresis Liver protection Relief of ketosis	Occasionally pyrogenic breakdown properties from sterilization
Hartman's solution	Buffering action against alkalosis or acidœmia	Not always available
Blood or plasma	Replacement of protein loss	Not always available Tends to stop drip

In a single infusion over a period of twenty minutes, not more than 15 c.cm. per kgm. body weight should be given. If a continuous drip is arranged, the amount should be between 150 and 200 c.cm. per kgm. body weight each twenty-four hours.

Cardiac stimulants: Incipient cardiovascular failure is treated by subcutaneous injections of nikethamide solution, 0.25 to 0.5 c.cm., or solution of suprarenal cortical extract, $\frac{1}{2}$ to 1 c.cm. four-hourly.

(2) *Specific treatment.*—The precise cause of the gastro-enteritis must be discovered before the application of specific remedies. Causes fall into three main groups:—(a) Errors of feeding; (b) parenteral infection; (c) primary infections of the alimentary tract. History-taking and physical examination will usually reveal the causes in groups (a) and (b). Bacteriological examination of the stools or of a rectal swab will sometimes give a precise causative organism in cases in group (c). There are, however, many instances in the third group in which a causative organism is either a bacterium not commonly recognized as pathogenic, or a virus. Consequently, some cases of primary infection must be recognized as a matter of clinical judgement.

(a) Errors in feeding, especially in bottle-fed infants, may be gross, either in the quantities offered or in the choice of artificial food. After a period of alimentary rest, accompanied in the milder cases by a dose of castor oil, the only treatment necessary is the re-institution of a sound feeding regimen.

(b) Parenteral infections, of which the commoner are otitis media, acute tonsillitis, coryza, pneumonia, pyelitis and meningitis, can for the most part be successfully treated in themselves, the diarrhoea and vomiting in the meanwhile being handled on symptomatic lines. As the underlying infection is mastered, the gastro-enteritis comes to an end.

(c) The hopes raised for chemotherapy of primary infections of the gut by the sulphonamide group of drugs have not been completely fulfilled. Of the known pathogenic organisms only a proportion seem susceptible to these drugs and, in the unidentified virus and bacterial infections, their empiric use produces little effect. Sulphaguanidine and succinyl-sulphathiazole, in four-hourly doses, totalling 0.2 gm. per kgm. body weight a day, are successful in cases of Flexner or Shiga dysentery, but they are usually ineffective in the commoner Sonne dysentery. They prove successful, also, in some of the cases due to atypical coliform bacilli. In the remaining infections they are approximately as ineffective as the older treatment with salol or chalk and mercury. The types of organism causing acute primary gastro-enteritis in infants are not those susceptible to penicillin.

(d) Treatment still to be evaluated. The administration of hydrolysed protein by mouth or intravenously has still to prove its value. Theoretically the method has advantages in the provision of amino-acids, such as methionine, both as food and as liver-protecting substances. In practice, the advantages have not become obvious and the intravenous use of hydrolysed proteins is difficult because of the fever-producing properties. On the other hand, the use of γ -globulin early in a primary infection may prove to be an advance by providing the infant with a means of rapidly developing his own defence mechanism.

(3) *Restoration to normal function.*—This phase of the treatment is, in its way, as important as the symptomatic and specific. When the infant's life is out of danger he must be led back to normal feeding by easy stages. Starting with sips of water or half-strength saline by mouth, he is later induced to take feeds of a low-fat and low-carbohydrate content, such as reconstituted skimmed dried milk or one of the more complicated low-fat, low-carbohydrate proprietary preparations. As soon as tolerance to this is established, cane sugar is cautiously added to the feeds. This is followed by the addition of fat until the diet is restored to normal.

CHARLES F. HARRIS, M.D., F.R.C.P.

NOTES AND QUERIES

Recurrent Boils in Childhood

Q.—Can you suggest some treatment of recurrent boils in a baby? This child is in the second year of life and is becoming quite an in his habits, but seems to get boil after it, usually in the napkin area. He is otherwise well, with a good diet and all the necessary complements.

A.—Infants, like adults, get phases of susceptibility to staphylococcal infection, and the constitutional factors determining this disposition are not understood. It is generally thought desirable to restrict sugar and starch, and to increase the vitamin B complex. All the vitamin supplements to infants' diets, the vitamin B fraction usually receives the least consideration. Full doses of bema or biplex should be given, with the restriction indicated above. The second factor is auto-inoculation from discharging lesions, and to prevent this the skin should be washed in weak alkaline water with carbolic or neko soap, and then wiped over with a lotion of:—

Liquified phenol	10 minims
Mercuric chloride	$\frac{1}{2}$ grain
Salicylic acid	5 grains
Industrial methylated spirit	120 minims
Camphor water	1 ounce

an antiseptic powder, such as sulphamerizolate, is also an additional safeguard.

The child should not be over-clothed, because sweating also increases the chance of infection. General ultra-violet light, by drying and stimulating the skin and its natural defences, is a useful additional measure.

R. T. BRAIN, M.D., F.R.C.P.

The Treatment of Chronic Pemphigus

QUESTION.—I should be grateful for assistance in the treatment of a man aged seventy-one, who has chronic pemphigus involving the scalp and the front of the chest. All local and constitutional treatments which have been tried so far have been wholly unsuccessful. The vesicles appear in groups, dry up and then re-form; there is marked irritation. Perhaps I ought to add that the patient also has chronic rheumatoid arthritis and seborrhœa.

REPLY (from a dermatologist).—Chronic pemphigus sometimes responds to arsenic by the mouth in high dosage or neoarsphenamine given intravenously. If the general condition permits, small doses of X-rays might help. Locally, acriflavine solution 1 in 1000, combined with eucerin in equal parts may prove useful. Massive doses of vitamin D have been advocated

in some quarters. Germanin (Bayer '205') has been given with success, but is not free from reactions in some cases. Whilst the above are applicable as routine measures, it should be stressed that without more knowledge of the general and local state of the patient these suggestions are open to qualification.

Nail-Biting

QUESTION.—What are the latest views about nail-biting in children and its treatment? I am a little frightened at the psychological emphasis which seems to be placed on this symptom and would like some general advice.

ANSWER (from a children's physician).—Small children often go through a temporary phase of exhibiting this habit which passes off with ordinary commonsense handling, such as giving the child a manicure set and encouraging him or her to keep a neat and tidy appearance. If the habit persists and is troublesome in late childhood it has a deeper significance and is much harder to get rid of. In general, it is the result of a feeling of insecurity and frustration, possibly dating from infancy, and it will often require the resources of a "child guidance" team to get at the root causes of the symptom. The application of aloes or nasty tasting substances, or the use of restraining appliances, are usually more likely to do more harm than good by accentuating the local condition. The child's attitude to life generally, to the parents, to school, and so forth, must be carefully ascertained and advice given to all concerned to correct the family tension so often present. There is no need to be "frightened" of the psychological implications. Modern child guidance teams will be free from undue bias in the direction of any particular school of psychological thought.

Post-Pleuritic Pain

QUESTION.—I have a female patient in her late twenties who first came under my care two or three years ago on account of a pleural effusion. No definite evidence of tuberculosis was obtained and she made a satisfactory recovery, with one exception. Periodically, particularly during the winter, she complains of a dull gnawing pain in the chest on the same side as her effusion. Clinically and radiologically the lungs are clear and her general condition is excellent. This is not an isolated find in my practice, and I should be grateful for information concerning the cause of such post-pleuritic pain and also for any help concerning the treatment. Is the pain associated with pleural

adhesions? Is it a rheumatic manifestation, or is it merely a neurosis?

REPLY.—Pain on the affected side is not uncommon for several years after an attack of pleurisy. It does not matter whether the original condition had been thought to be tuberculous, or the type which is commonly associated with pneumonia. Although it is customary to explain this pain in terms of pleural adhesions, the fact is that adhesions are not always present; the induction of an artificial pneumothorax is a diagnostic test in cases of this type, and it frequently fails to reveal adhesions of any sort. It is much more likely that the pain is what might well be termed a "pain of reminiscence", and that it is, in fact, a neurosis. The pain often disappears on reassurance of the patient, and even the suggestion that a blister might have to be applied is frequently effective.

JAMES MAXWELL, M.D., F.R.C.P.

Medical Witnesses

QUERY.—As police surgeon I was called to the Sheriff Court to give evidence in a case in which a motorist was charged with being under the

influence of alcohol. The law agent for the defence asked for my notes of any examination and protested strongly when I stated that I had not them with me. I understand that a medical witness does not require to produce these notes but can use them if he pleases, to "refresh his memories." I shall be pleased to have an authoritative legal opinion on this matter as this is the second occasion on which the same agent has raised it. The Sheriff passed no comment at the time.

REPLY.—The subscriber is right in supposing that the notes which a police surgeon makes when he examines a suspect are not open to inspection by the defence, although he may use them when he gives oral evidence, for the purpose of refreshing his memory. If the accused person is to be charged on an indictment, and the police surgeon is one of the persons on the list of Crown witnesses, then the defence can call for a written statement of his evidence; but that seems to be quite a different matter from the subject of the present inquiry.

D. HARCOURT KITCHIN, *Barrister-at-Law*

PRACTICAL NOTES

The Control of Fætid Wounds

ONE of the most distressing features of many patients with intestinal or urinary fistulæ, suppurative wounds, necrotic tumours and gangrene, is the all-pervading fætor which is so disturbing to the patient and his visitors, and often contaminates the whole ward or sickroom. W. W. Babeock (*Journal of the American Medical Association*, December 15, 1946, 129, 1094) recommends two simple agents which he has found effective in controlling this factor—potassium permanganate and bromine. In the case of the former, the affected area is covered with several layers of gauze or cotton-wool saturated with 1:300 to 1:500 aqueous solution of potassium permanganate. This simple procedure is effective, provided the dressing is not allowed to dry and the permanganate is re-applied at regular intervals. The objection to the method is that it stains the bed linen as well as the skin, and this stain can only be removed by a solution of oxalic acid, which is liable to damage the fabric. Bromine does not suffer from this disadvantage. Whilst in extreme cases a 1:500 solution may be required, this strength should not be used unless absolutely necessary, as it is highly pungent and may be irritating to sensitive surfaces. The usual strength is 1:1000 to 1:2000, and this may be applied on gauze or other absorbent dressing

for long periods with little or no resultant irritation of the skin. It is necessary to moisten the dressing from time to time with the solution. Babeock has found that not only does it overcome the odour, but in addition sloughy wounds usually develop red, firm granulations, become clean of necrotic tissue, and heal rapidly. As bromine solution is decomposed by light and becomes colourless and inert, it should be kept in brown glass bottles.

The Prevention of Premature Labour

THE problem of premature labour is one that is assuming increasing importance, and the extent of the problem is strikingly emphasized by Canadian workers (W. Shute and E. Shaw, *Journal of Obstetrics and Gynaecology of the British Empire*, December 1945, 52, 57) who point out that "it is more than twelve times as dangerous for a premature infant to be born in Canada as it was for a Canadian man to enlist in the war", and that, taking 1940 as a representative year, "during the war Canada lost 35,360 premature babies, almost as many citizens as she lost by enemy action" (40,97). In reporting a series of 63 consecutive, selected cases of threatened and actual premature labour (defining prematurity by 1

iteration of $5\frac{1}{2}$ lb. weight and more than 28 weeks' gestational age), they are able to claim survival rate of 73 per cent. The only treatment given, apart from temporary rest in bed, as vitamin E. It was found that a tendency to remature labour could usually be detected by the finding of a high blood oestrogen level: this occurred in 87 per cent. of the 38 patients in whom the blood oestrogen was estimated. It is therefore suggested that routine estimation of the blood oestrogen should be made during the first antenatal examination. Should this be raised, then vitamin E should be administered, and it is emphasized that a potent preparation should be used. In some cases large doses are necessary—75 to 125 mgm. of alphatocopherol. As pregnancy progresses, increasingly large doses of vitamin E are required, and the best guide to dosage is the occurrence of any sign of the onset of labour, i.e., should the patient complain of uterine tenderness or sacral backache, or should there be spotting of blood, loss of amniotic fluid, or a feeling of prolapse or impending menstruation, then the dosage of vitamin E should be increased immediately.

Spontaneous Gangrene of the Scrotum
SOMETIMES known as Fournier's gangrene, the criteria laid down by Fournier for its diagnosis were:—(1) an explosive onset in an otherwise healthy man; (2) the rapid progress of the gangrene; (3) the total absence of the usual causes of gangrene. In describing a case which ultimately recovered, O. T. Mansfield (*British Journal of Surgery*, January 1946, 33, 275) discusses the etiology and the treatment of the condition.

His patient was a man, aged forty-three, who was admitted to hospital in a moribund condition. The whole of the scrotum, with the exception of three triangular areas, was entirely gangrenous. The gangrene extended along the under surface of the penis, and there was a spreading cellulitis from the pubic region to the costal margin. Incision into the gangrenous area produced a free flow of turbid fluid, culture of which gave a heavy growth of hemolytic streptococci and *Staph. aureus*. The testes and all the structures of the spermatic cord were normal. The whole of the gangrenous area was removed, and section showed no abnormality, other than marked interstitial oedema with many thrombosed vessels. The patient was discharged from hospital six weeks after operation, and when seen a year later the testes were freely mobile in a small but well-formed scrotum; there was a scar band between the under surface of the penis and the anterior wall of the scrotum, but this produced negligible disability.

Various theories have been advanced concerning the etiology of the condition: for example, that it is a fulminating erysipelas, or that it is a gas-gangrene due either to *B. tetrahii* or to other anaerobes. Mansfield favours a third suggestion, i.e., that the condition is a vascular disaster of infective origin, analogous to cavernous sinus thrombosis. A review of the literature shows that in the majority of

cases the predominating organisms are streptococci or staphylococci, but Mansfield believes that there is no specificity of infection other than the existence of a pathogenic organism which causes rapid thrombosis in the vessels of the septum of the scrotum with consequent necrosis of the area supplied by these vessels. On the basis of this etiology, treatment should consist of radical removal of all sloughing areas, with the use of the sulphonamides or penicillin, if necessary. The recorded mortality varies from 22 to 31 per cent. Death is usually due to toxæmia.

The Local Cicatrizing Action of Digitalis Leaf

In addition to its common uses as a diuretic and a cardiac stimulant, the leaf of digitalis (foxglove—*D. purpurea*) has been used for the cleansing and healing of external ulcers. H. Leclerc (*Presse Médicale*, February 2, 1946, 54, 80), recording a case in which the local application of digitalis leaves to a wound which had proved refractory to healing resulted in clean cicatrization in twelve days, refers to an article in the *Journal de Pharmacie de Belgique*, July, 1943, in which the author, a surgeon, reports the good results obtained by the local application of digitalis leaves to wounds which had proved difficult to heal—the affected area cleared up, granulations formed and there was rapid cicatrization. The personal case recorded by the present author was that of a woman who sustained a deep gash in the palm of the hand whilst sawing wood. Greyish fungosities, from which oozed sero-purulent fluid, and which failed to respond to any local antiseptic, prevented coaption of the edges of the wound. Some fresh digitalis leaves were procured from the head gardener of the Botanical Gardens of the Faculté de Pharmacie, which, after washing in boiling water, were placed over the wound and a gauze dressing applied. The dressing was changed daily. At the end of one week the fungosities had subsided, the discharge diminished, and five days later the wound healed normally. Although, as the author points out, the case is an isolated one and therefore does not permit of definite conclusions, it may nevertheless be of interest, particularly to country practitioners who in the season are able to procure fresh, soft digitalis leaves from the woods.

The Management of a Colostomy

FANCY colostomy belts or bags are not recommended by J. B. Christensen (*Journal of the Iowa State Medical Society*, January 1946, 36, 1), who advocates the use of an elastic

abdominal binder or support. The best garment is a washable elastic "pantie"; the addition of a zipper down the centre or on each side is an improvement. The dressing used to cover the colostomy should consist of facial tissue or a similar toilet tissue, over which is placed a pad of "cellu cotton", and this in turn is covered by a piece of oiled silk or waxed paper slightly larger than the pad. The patient should be taught to dilate digitally the colostomy opening if there is a tendency for it to contract. The abdominal anus is washed with soap and water and the use of this should be initiated immediately after healing of the incision where the anus is placed. Should there be oozing of blood from the mucosal surface of the stoma, the daily application of 50 per cent. alcohol is recommended. The nearer the opening is to the cæcum, the more likely is there to be irritation of the skin by the bowel discharge; this is best relieved by the application of commercial hand lotions. When the skin is irritated by digestive juices, the surface must be covered with an aluminium paste. Control of the colostomy is achieved by (a) selection of a proper diet, (b) the acquiring of regular habits, and (c) the use of colonic irrigations. A low-residue high-protein diet is required, preference being given to milk and milk products, cream, rice, custard white bread and butter, lean meat, and eggs. Cooked vegetables and fruits may be taken, provided they do not cause watery stools. Few patients can tolerate fresh fruits, raw salads, hot drinks or alcoholic liquors. Highly seasoned foods, condiments and rich gravies must be avoided. The intake of fluid should not be excessive. By controlling the diet the patient can often ensure a regular stool morning and evening. Should this not be the case, then irrigations should be resorted to, and these should always be carried out at the same time each day. The irrigation consists of 1 to 2 quarts of normal saline at body temperature, using a no. 24 soft rubber catheter as the enema tip. If cathartics are found necessary, phenolphthalein or aromatic cascara in small doses is recommended. Mineral oil is contraindicated, as it produces a slippery liquid stool which cannot be controlled.

Varicose Veins treated by Precipitation Method

IN order to prevent the development of hard œdema in the region of the ankle which frequently results from the injection of sclerosing solution into the veins of the leg, W. Thompson (*Lancet*, December 29, 1945, 2, 849) has employed calcium gluconate to precipitate the sclerosing agent in the veins. Using a 5 per cent.

solution of sodium morrhuate or oleate, an injection of 10 per cent. calcium gluconate is previously given. Separate syringes must be used. The proportions employed are 1 c.cm. calcium gluconate to 2 c.cm. sodium morrhuate. The injections are given with the patient standing, and the isolation method is employed, i.e., about 6 inches of the central portion of the varicose vein is isolated by passing rubber bands around the limb, and the injections are made between the bands, 1 c.cm. of calcium gluconate being injected, the needle left *in situ*, and the syringe rapidly changed for the one containing morrhuate, 2 c.cm. of the 5 per cent. solution of which is immediately injected. The patient is told to press on the vein at the site of injection for one minute as the needle is withdrawn; he then lies down with the limb elevated, the bands are removed and he is allowed to walk about. After sclerosis has been produced in the proximal portion of the vein only one occlusive band is used, below the site of the injection, this being an essential part of the technique to prevent the solutions passing out of the vein and down the limb. When the long and short saphenous veins are tied at the femoral and popliteal venous junctions the same solutions are injected retrogradely. Sclerosis of the long saphenous vein as far as the knee can be obtained by the use of calcium gluconate 3 c.cm. and sodium morrhuate 5 c.cm. The method has been used on 175 patients after the Trendelenburg operation, the usual course lasting for six weeks, one of which was spent in hospital after the operation, the patient getting up on the second day and returning to light duties after removal of the stitches on the seventh day, after which he returns weekly for the injections. Although as many as 2,000 injections were given, there was no case of sloughing or embolism. Occasional areas of softening along the course of the vein appearing ten to twenty days after injection resolved after the application of elastoplast from the toes upwards, and left in place for three weeks. All the patients (soldiers) except two returned to full duties after the treatment.

The Effect of Thiouracil on the Blood

THE danger of the development of neutropenia and in some cases agranulocytosis, in patients with thyrotoxicosis undergoing treatment with thiouracil, is emphasized by M. F. Lenses and S. L. Gargill (*New England Journal of Medicine*, December 27, 1945, 233, 803), who report the occurrence of four instances of neutropenia or agranulocytosis (one fatal) in a series of sixty-two cases. In addition to the personal record the authors give a review of the case-

ported in the literature, from all of which it would appear that there is no direct relationship between the dosage and the duration of treatment and the development of symptoms. Hypersensitivity to the drug is the predominating factor, and for this reason patients undergoing treatment with thiouracil should be under strict supervision: once treatment is begun white cell counts must be made at least three times daily, and differential counts when the total white count drops below 5000. The symptoms of baryngitis and fever are no guide to the blood picture, as such symptoms may not develop until relatively late in the course of the disease. As the mortality of thiouracil agranulocytosis is 50 per cent., treatment of symptoms must be early and vigorous, consisting in stoppage of the thiouracil, the institution of penicillin therapy, when it is shown that spontaneous remission will not occur with omission of the drug alone, the administration of folic acid or large amounts of liver or yeast, pentnucleotide, and blood transfusions. Another fact stressed by the authors is, that intolerance to the drug may set in some time after the institution of treatment, is supported by the report of a fatal case of thiouracil granulocytosis by A. Trasoff, M. G. Wohl, and S. S. Mintz (*American Journal of the Medical Sciences*, January 1946, **211**, 62). The patient had been under treatment for seven months, receiving 0.6 gm. thiouracil daily for one month, after which time all symptoms were relieved and the patient had gained weight. He was put on a maintenance dose of 0.1 gm. four times daily. Two months later there was a fall in the white cell count and Lugol's solution was given in conjunction with the thiouracil. One month later the patient was admitted to hospital in a semi-stuporous condition, and death occurred two days later.

Further Dangers of Prophylactic Sulphonamides

YET another example of the risks attached to the prophylactic use of the sulphonamides is contained in a report by R. H. Abrahamson (*American Journal of Syphilis, Gonorrhoea and Venereal Diseases*, November 1945, **29**, 641), who found that the administration of 1 gm. of sulphadiazine daily as a prophylactic measure against respiratory infections in a large American naval training centre, was accompanied by an increase in the incidence of sulphonamide-resistant gonorrhoea from 30.3 per cent. to 77.03 per cent. For three months the prophylactic dose of sulphadiazine was given to 15,000 of the 25,000 recruits at the centre, the remainder being used as controls. Following

this period all the recruits were given sulphadiazine for a further three months. During this total period of six months there was a sharp drop in the incidence of respiratory and streptococcal disease. There was, however, no drop in the incidence of gonorrhoea. During the quarter preceding the use of prophylactic sulphadiazine the incidence of gonorrhoea was 11.38 per thousand per year; during the next two quarters (i.e., when sulphadiazine was being given) it was 12.92 and 14.44 respectively, whilst in the quarter following the suspension of sulphadiazine administration it was 10.24 per 1000 per year. During the quarter prior to the use of prophylactic sulphadiazine the incidence of sulphonamide-resistant gonorrhoea was 30.3 per cent. During the next quarter the figure rose to 49.4 per cent., whilst during the following quarter (i.e., when all the recruits were receiving prophylactic sulphadiazine) the figure rose to 77.03 per cent. Attention is drawn to the increasing number of reports of sulphonamide-resistant strains of gonococci, and it is suggested that part of this increase may be due to the increasing prophylactic use of the sulphonamides. Attention is also drawn to the effect that such widespread use of the sulphonamides may have upon the use of sulphadiazine as a prophylactic against gonorrhoea. In the case of gonorrhoea this may not be of great significance, in view of the tendency for sulphonamide-resistant gonococci to be penicillin-sensitive, but there may well be other penicillin-resistant but sulphonamide-sensitive organisms that will be rendered sulphonamide-resistant by this indiscriminate use of sulphadiazine as a prophylactic.

Castor Oil Emulsion

A FORMULA for castor oil emulsion, which provides a variation from the usual mixture, is given in the *Pharmaceutical Journal*, February 9, 1946, **156**, 88. The formula, which is abstracted from *Pharmaceutica Acta Helvetica*, 1945, **20**, 320, is as follows:—

Castor oil	40 c.cm.
Saccharin	0.02 gm.
Vanillin	0.04 gm.
Absolute alcohol	0.44 c.cm.
De-enzymated acacia	10 gm.
Tragacanth	2 gm.
Extract of dry coffee (Nescafé) ..	4 gm.
Water	to 100 c.cm.

Dissolve the saccharin and the vanillin in the alcohol, add to the castor oil and rub down with the acacia and tragacanth. Add 20 c.cm. of water to prepare the primary emulsion. To the remainder of the water add the coffee extract, mix, and make up to volume.

REVIEWS OF BOOKS

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THIS interesting book consists of three sections which include a wealth of practical material and accurate clinical deductions. Section 1 deals with a practical concept for the treatment of major and minor burns; the method outlined is based on "timing" which the authors consider essential. By "timing" is understood the anticipation of the problems commonly met with, i.e. (1) shock; (2) toxæmia; (3) sepsis; (4) scarring and contractures. The local application favoured consists of an emulsion of 5 per cent. sulphathiazole oil in water, together with a pressure dressing. The detailed technique is described with an accurate timetable. Section 2 is a report on the management of burns, and contains a review of two years' experience of over 200 major and minor accidents. The burns are divided into three groups: (a) according to the area of body surface involved; (b) according to depth of burn; (c) according to results of treatment. Section 3 gives the results of the treatment of wounds and infections by means of infrequent occlusive dressings, carried out according to planned "timing". The book is of value for its practical nature and for the sound judgements expressed, and will be welcomed by those interested in the subject of burns.

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expressed concerning the merits of the various forms of treatment that were tried. The authors are refreshingly free from any narrow sectional views on psychological theories. Eclectic in their outlook they have skimmed the cream of all the relevant schools of psychological thought and have approached in an essentially practical manner the tremendous problem with which they were faced. Their predominant method of treatment was narcosynthesis, and the results achieved fully justify the technique adopted. The book concludes with a section devoted to "civilian applications", in which the application of their work to civilian psychology and its general civilian implications are discussed. This is a book to be read and pondered, not only by psychologists, but also by practitioners; in it they will find much that will assist them in understanding, and dealing with, their patients in the difficult times that lie ahead. As the authors put it: "It is a moot question whether in the peace which will follow the present conflict, the degree of stress on the average individual will be much less than that imposed by the war".

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THE EDITORSHIP

THE PRACTITIONER announces the appointment of Sir Heneage Ogilvie, K.B.E. M.D., M.Ch., F.R.C.S., as Editor in succession to Dr. Alan Moncrieff, M.D., F.R.C.S. who has resigned on being appointed to the Nuffield Professorship of Child Health at The University of London. Sir Heneage Ogilvie, who received his knighthood in the New Year Honours List, for distinguished services during the war, is surgeon to Guy's Hospital, a Vice-President of the Royal College of Surgeons, and Honorary Major-General and Consultant Surgeon to the British Army. Dr. William A. R. Thomson, who joined the editorial staff in 1944, will continue as Associate Editor.

Professor Moncrieff joined *The Practitioner* as Joint Editor in 1934, and in 1935 succeeded the late Sir Humphry Rolleston, Bt., as Senior Editor.

These changes in the editorial staff do not indicate any change in the general policy of *The Practitioner*, which is still that described by F. E. Anstie, founder and first Editor, in the preface to the first issue in 1868.

NOTES AND PREPARATIONS

NEW APPARATUS

THE CROOKES ADAPTOMETER—This apparatus, primarily constructed for routine testing of dark adaptation in the consulting room, in industry, the Services, and elsewhere, can also be used for perimetry at low intensities. The apparatus consists of two parts, the bleaching or light adapting apparatus and the test light unit. A voltage stabilizer, which produces a steady output of 230 volts A.C. from any voltage between 190 and 260 volts, permits the use of the apparatus with most electric supply services, without modification. The 12 volt circuit for the bleaching lamps and the 4 volt circuit for the test lamp are supplied by a compound transformer, and in both circuits variable resistances are incorporated to provide final fine adjustments to standard brightnesses. The manufacturers of the apparatus are the Crookes Laboratories (British Colloids Ltd.), Park Royal, London, N.W.10, from whom further particulars and literature can be obtained.

NEW ORGANIZATION FOR THE TREATMENT OF CANCER

AN experimental cancer scheme has been evolved by the Royal Cancer Hospital which, in cooperation with a number of hospitals—the Brompton, the Chelsea, the Gordon, the Princess Beatrice, the Royal Free, the Royal London Ophthalmic, the Royal National Nose, Throat and Ear, and the West End Hospital—provides for the examination of patients at cooperating hospitals by a team of physician and/or surgeon and radiotherapist, following which the main lines of treatment are laid down, the full resources of all the cooperating hospitals being available.

TUBERCULOSIS: REFRESHER COURSE 1946

REFRESHER courses for medical practitioners and tuberculosis officers are to be held at: Papworth Village Settlement from June 18 to 20, 1946; at the London School of Hygiene and Tropical Medicine from September 23 to 25, 1946, and at Newcastle-on-Tyne from November 4 to 8, 1946. Courses are also to be held in London and Newcastle for almoners, health visitors, social workers, and chief clerks. Further particulars can be obtained from Dr. H. B. Williams, Tavistock House North, Tavistock Square, W.C.1.

OFFICIAL NOTICES

Control of Rubber Gloves (circular 24/46), issued by the Ministry of Health, deals with the issue of rubber gloves to practitioners, midwives and nurses. Any practitioner requiring rubber gloves for professional use should apply to the Secretary of the Central Medical War Committee, British Medical Association, 1 Tavistock Square, London, W.C.1. **Disinfection and Immunization** (circular 23/46) refers to a brochure setting out details of the public material available to authorities for local campaigns during 1946. Practitioners are asked to cooperate by spreading the propaganda among their patients. **Tables of Representative Foods of Foods Commonly Used in Tropical Countries** by B. S. Platt, issued by the Medical Research Council (special report series no. 253) will be found of particular value by practitioners working overseas or intending to do so. A copy can be obtained from H.M. Stationery Office, price 6d.

COMMON DIFFICULTIES IN THE DIAGNOSIS AND TREATMENT OF CUTANEOUS DISEASES

By R. M. B. MacKENNA, M.D., F.R.C.P.

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In all branches of medicine the practitioner who is successful is usually harassed by the relentless pressure of time. Consequently he tends to adopt short cuts in the investigation of his cases. Some of these time-saving devices are safe, but most of them are hazardous. In few branches of medicine is the temptation to save time by omitting to take a full history more attractive than in dermatology, for in many cases it is possible to recognize the malady as soon as its nature and extent are seen. Therefore why waste precious minutes with a procedure that is arduous, difficult and time-consuming? I believe, however, that in nearly all cases an accurate history should be obtained, and that it should be taken before examination of the patient. Many dispute this; they say that if the patient is examined first the clinician will know how much or how little to inquire about; he can be relevant, and he can save time. The issue really depends upon many factors, including the practitioner's own attitude towards cutaneous maladies and his knowledge of dermatology. If a practitioner believes that anything difficult should go to a specialist, case taking can largely be omitted (except in so far as a specialist always welcomes help from the practitioner who really knows the patient). If, however, a practitioner is working alone, and particularly if he tends to be "rattled" on seeing a rash which is not recognizable at the first glance, then case taking before clinical examination is always advisable. I have known many cases in which, had a careful history been taken at the outset, difficulties in diagnosis would not have occurred; this applies particularly to cases in which an occupational hazard is associated in the patient's mind with the outbreak of his eruption.

HISTORY TAKING

In taking a case history there are certain questions which are of paramount importance; among them are the following, which may be colloquialized as necessary:—

- (1) Have you previously suffered from a skin eruption?
- (2) Do any near relatives (parents, siblings, children) suffer from an eruption?
- (3) When did the rash from which you are suffering first show itself?
- (4) Where on your person did it start?
- (5) What areas were next involved?
- (6) What areas does the eruption now cover?
- (7) Does it itch?
- (8) Has it changed its character since the onset?
- (9) What is the nature of your employment?

Obviously this list is not comprehensive, but it gives some indication of the salient points concerning which information should be sought. If a contact dermatitis from clothing, cosmetics, industrial hazards or other cause is suspected, the questions may need to be modified and others added; in certain maladies which may have an allergic basis, e.g. eczema, many more details concerning the past medical history of the patient and his relatives will be required.

The object of the first question is obvious; it fixes a position in the patient's lifetime which may affect diagnosis to a great degree. The purposes of questions 2 and 3 are also obvious.

Questions 4 and 5 are important; many maladies, from acne vulgaris to zoster, have either characteristic modes of onset or sites of election, or classical areas of distribution, and the information gained from these questions may be a valuable clue to diagnosis. Obviously, in cases of occupational dermatitis these questions are of paramount importance.

Question 6 is designed to avoid an error which is often a pitfall in clinical assessment. Provided it is answered accurately it helps to avoid the common difficulty which occurs when, after the examination, whilst the patient is doing up his last button, he remarks casually, "Of course, I've got a bit of trouble in my armpit (or groin, or other relatively inaccessible place)." Such a question would not be necessary if the ideal method were adopted, whereby every patient is stripped and examined in the nude, however trivial his complaint may be; but this is scarcely practical in view of the temperament of the people of these islands, and in view of the difficulty which many practitioners have in getting their consulting rooms warm enough for the patient to be stripped without suffering from cold. Here it

may be noted in parenthesis that many difficulties arise from incomplete examination of the patient's integument, and can often be obviated by a scrutiny of the whole of the skin.

Question 7 is not of great assistance but may be of importance in the differential diagnosis of maladies such as scabies, dermatitis herpetiformis, psoriasis and syphilis.

Question 8 is asked so that the practitioner may be forewarned lest dermatitis medicamentosa has developed; also it has other bearings, for the answer may indicate that a trivial dermatosis has changed to a chronic pruritic, lichenified eruption, or it may help to assess the stage which an eczematous or psoriasiform process has reached. The purpose of question 9 is obvious.

The *common errors in assessment of a clinical history* are failure to allow for carelessness or purposeful forgetting in the patient's answers, and also failure to allow for the fact that, because of shyness or other cause, complaint has not been made concerning eruptions on the genital, gluteal or mammary areas. It is well to remember that each individual varies in his appreciation of itching, and that one man may have scabies and say little concerning this symptom, whilst another, suffering from psoriasis or secondary syphilis, may state categorically that he is much bothered by this form of discomfort.

DIAGNOSIS

Scabies having been mentioned, two facts may be worth noting: the first is that if a soldier suffering from this infestation is asked if anyone else in his family has a similar eruption, he frequently repudiates the suggestion, although subsequent investigation may show, not only that his wife and family have the malady, but also that they have had it for a longer period. Possibly the origin of this common denial is fear lest his leave be curtailed, but the same thing occurs in civilian practice and appears to be due to reluctance to acknowledge that the next of kin are suffering from an infestation which is generally regarded as being due to lack of personal cleanliness.

The second point is that *dermatitis herpetiformis*, although not a common malady, is not infrequently confused with scabies; many patients suffering from the former disease complain that they have been treated with benzyl benzoate or sulphur ointment on many occasions, despite their protests that these remedies fail to give them relief. Few things are certain in therapeutics, but one of the most certain is that either of these two remedies, if properly applied, will cure sarcoptic infestation; even if carelessly used they usually produce some amelioration. Admittedly, sulphur ointment is beneficial in some cases of dermatitis herpetiformis, but it is seldom that it gives as much relief as in cases of scabies. Therefore if a case which is thought to

be an example of the latter malady fails to respond to the usual remedies, the possibility of this alternative diagnosis should be borne in mind.

Difficulties in diagnosis may arise from *lack of knowledge of prevalent maladies*. It is cogent to reiterate the warning given by the Ministry of Health (1945) that the incidence of ringworm of the scalp is increasing in many areas in the British Isles. Often it is difficult to trace the source of the malady, and, in this connexion, it is well to remember that Duncan (1945) has emphasized that domestic animals may be vectors of *tinea capitis* (and also *tinea corporis*). These animals may carry the disease without showing any definite signs of infection, and a competent veterinary opinion should be sought before they are exonerated.

There is a widespread belief that *tinea pedis* (athlete's foot, foot-rot, epidermophytosis) is very prevalent. Most dermatologists agree that this malady is not so common as is generally believed, and that of every 100 cases referred to hospital with this diagnosis only 20 can be proved to be suffering from fungous infection. It seems often to be forgotten that on the feet, particularly on the toes, there are areas where maceration from sweating, injury from friction and pressure, and infection from pathogenic bacteria of low virulence can easily occur. Fortunately, many lesions of the toes and webs respond satisfactorily to the antiseptics used to combat tinea, particularly if these are incorporated in alcoholic solutions, so that, although the diagnosis may be at fault, cure may be achieved; but, in many cases, irritation of the skin by the medicaments, with or without sensitization, may occur, and there are scores of patients, particularly persons who have been abroad, who are assiduously perpetuating chronic dermatitis medicamentosa by regularly and conscientiously applying fungicidal agents to their toes, hoping to cure a fungous infection which does not exist. A suitable regimen for many of these cases is to ensure that fungus is not present by applying soaks of normal saline for about ten days and then having a careful mycological investigation made; thereafter, if fungus is not found, the use of bland dusting powders, or zinc paste (not containing salicylic acid), or other simple, non-irritating applications, is indicated.

A fact with regard to tinea, which may assist diagnosis and which is not noted in many textbooks, is that *tinea cruris* is common in men but seldom occurs in women. Another point which may be of interest is that the theory that tinea of this type is usually contracted on the feet and then transferred to the groins is disputed. Many now believe that tinea is more usually transferred from the groins to the toes than *vice versa*.

THERAPY

Penicillin.—The apothegm that lotions should be prescribed for acute conditions, pastes for subacute lesions, and ointments (or pastes) for chronic eruptions, summarizes a good deal of truth, but many consider that it is so

elementary that it can often be disregarded. Nevertheless, many difficulties in therapy can be obviated by adherence to these elementary principles. To take an example from one of the most modern innovations in therapeutics: consider the treatment of impetigo contagiosa with penicillin; an ointment containing 500 Oxford units of the antibiotic in each gramme will often rapidly cure this malady, but a spray containing 500 Oxford units per cubic centimetre of aqueous solution will, if applied frequently, cure the disease with slightly less risk of complications. The reason for this is that not only does the use of the spray obviate the use of dressings which, if carelessly removed, may cause injury, but also that most penicillin ointments or creams contain emulgents which, either because of their chemical nature or because they have undergone hydrolysis, are irritating to certain skins. These hazards, which admittedly are slight, are obviated by the use of a spray, but the spray has the disadvantage that it must be applied every three hours (the parts being left uncovered between treatments), whereas penicillin ointment needs to be applied only twice daily.

In prescribing local therapy with penicillin it is well to remember not only that under normal conditions ointments containing this substance should be renewed every ten or fourteen days, because, under conditions of use, the penicillin loses its potency as time passes, but that it is inadvisable to continue to use the antibiotic continuously for an indefinite period. If penicillin is going to benefit the patient, it will exercise its effect within a relatively short time; further, there is an optimum period during which it can be used, for in time, organisms which have previously been penicillin-sensitive may develop resistance to the drug. It has been shown that resistant strains of normally sensitive species of bacteria may be obtained *in vitro* by subculture in broth containing penicillin. The resistant strain so obtained loses its virulence and is more easily killed by the body mechanisms, but it can withstand up to 3,000 times the concentration of the antibiotic tolerated by the parent strain. It has been suggested that the ability of these strains to withstand such high concentrations may be due to their greatly reduced rate of growth, for the lethal and lytic actions of penicillin are believed to be exercised only upon dividing bacteria. In time, sufficient data will be available to determine the optimum period of application of penicillin to different dermatological lesions, and it may well be found that the best results are obtained if it is used for a relatively short period, such as five to seven days, during which time many of the invading bacteria will be killed, but a relatively small number may remain in a quiescent state; this remnant will be encouraged by suitable therapy to start active growth and reproduction, and thus, by being made vulnerable to the lethal effect of antibiotics, will be destroyed by further use of penicillin.

Sulphonamides.—Clinicians who have successfully employed sulphonamide ointments or powders in the treatment of infective dermatoses are

often extremely sceptical of sulphonamide dermatitis as being a hazard which is of practical importance. H. W. Barber has already discussed this matter in *The Practitioner* (1944) and has described the mechanism whereby epidermal sensitization occurs. In these circumstances it is only necessary to reiterate that sulphonamide remedies should not be applied to the skin for longer than seven to ten days (some authorities would say five days was the maximum), and that sulphonamide dermatitis is a very real hazard. Nevertheless, in selected cases—preferably those patients who give a clear history that they have never previously received local therapy with sulphonamides—ointments containing sulphathiazole or sulphadiazine are extremely satisfactory in the treatment of certain infective maladies of the skin, such as impetigo contagiosa. It should be remembered that usually the first sign of the development of sulphonamide dermatitis is that the lesion which is being treated appears to become worse. This is an indication that sulphonamide therapy should be stopped at once; it is not an indication that the concentration of sulphonamide is not adequate and therefore should be increased.

Acridflavine seems no longer to be the innocuous remedy which it was generally supposed to be. Acridflavine dermatitis is not uncommon, and if eczematization occurs in the neighbourhood of an abrasion or wound which is being dressed with a lotion or emulsion of this compound, sensitization should always be considered. If the treatment is continued, a widespread dermatitis may rapidly ensue. Probably the hazard is considerably less with acridflavine than with the sulphonamides, but in either case it is a most unfortunate development and one which may incapacitate the patient for several weeks.

THE PROBLEM OF THE PATIENT

One of the most common difficulties in dermatological therapeutics arises from the discovery that whilst one patient is rapidly cured by the use of a series of simple applications, another, suffering from the same malady in the same stage of efflorescence does not derive any benefit from the regimen and, in fact, may become worse. Often this is not due to faulty prescribing or to incorrect diagnosis, but to the patient himself, for whilst some men appear to be incapable of applying even zinc ointment to their skins with any degree of efficiency, others elaborate the simple procedure which has been ordered into a daily ritual of cleaning with oils, washing with antiseptics, anointing with unguents, and dressing the part with layers of lint, cotton-wool, and bandage; particularly is it necessary to be on guard against the practice, which is very common, of giving the inflamed areas a thorough cleansing each morning with carbolic soap. Because of these common hazards it is essential for the practitioner to differentiate between the sensible patient, and the dull and backward, the happy-go-lucky, and the obsessional. The first of these menaces to therapeutic tranquility, the man of low intelligence,

should be placed in the care of a competent nurse or relation at the earliest opportunity; the second is best dealt with in the same way (but he often defeats the best endeavours by escaping from his supervisor during convalescence, and thus protracts his illness); the third must be impressed with the fact that what you have ordered, applied as you have directed, is entirely adequate, and that any elaborations of your simple directions may be extremely harmful; but even with this warning, which has to be frequently repeated, you may find yourself circumvented by his ingenuity.

As an example of an extremely simple procedure which, if properly carried out, is successful in at least 75 per cent. of cases, but which can be ruined by carelessness or over-elaboration, reference may be made to the observation made by Sydney Thomson (1943) that plantar warts—those small, painful, infective lesions which arise in the soles of the feet, especially in children of school age—will respond to simple therapy with an aqueous solution containing 3 per cent. formalin. The solution containing the drug in the proper concentration is poured into a doll's saucer, and the affected area is immersed for ten minutes each night. Pain disappears after seven or ten days, and in three or four weeks' time (occasionally seven or eight weeks are required) the warts soften and can be removed with forceps, leaving soft epithelium in the depths of the crater. The success of this procedure depends entirely upon attention to detail; the size of the receptacle is important so that the heel or the anterior part of the sole can rest in the solution without the thinner skin on the top of the foot being wetted, for formalin will irritate delicate skin. Regularity of treatment and strict attention to the duration of each immersion, are essential. In view of these facts the reader will appreciate the cogency of the sage's remark that "you can cure some of the people some of the time, but not all the people all the time".

REHABILITATION

Another common difficulty in dermatological therapy in civilian practice concerns the proper disposal of patients during convalescence, for there are few convalescent homes where they are welcome, and if they remain at home they are likely to spend a large part of the day in too close proximity to a fire. Further, most of these people, be they men or women, are perfectly fit to undertake suitable tasks which may vary from philately to farm work, and the majority benefit from their employment, particularly if they regard the work as purposeful, interesting and useful. A pioneer rehabilitation centre for military patients was opened in Warwickshire in 1943, and was a successful venture. The Interim Report of the Committee on Dermatology recently issued by the Royal College of Physicians refers to this matter, which also has been considered by the Yorkshire Regional Hospitals Committee; in this report it is recommended that a rehabilitation centre for dermatological cases should cater for children as well as for adults. Facilities

should be available for the care and education of children suffering from different dermatoses, and for the rehabilitation of adults who have been disabled through industrial or professional hazards, as well as for those suffering from household ills. Here, also, patients suffering from incurable maladies would be taught how to live within the limits of their physical disabilities.

There are many investigations to be made concerning the rehabilitation of persons suffering from cutaneous diseases; even in the limited experience which is available it has been interesting to note how preconceived ideas have had to be discarded and many beliefs altered. For example, several patients who were thought to expose themselves to the danger of a relapse if they undertook hard physical work, were found to benefit if they were gradually introduced to relatively hard physical labour, such as helping in routine duties on a farm. Others relapsed if given lighter work which they found uncongenial. Bolam (1945), working under military conditions, found that of the diseases to which soldiers in the United Kingdom were prone, selected cases of seborrhœic dermatitis, eczema, furunculosis, pyodermitis, sulphonamide dermatitis, and lichen planus, were the best material for those facilities for rehabilitation which were available in Ragley Hall in Warwickshire. In civilian practice the scope will be much wider.

If dermatological rehabilitation centres are founded, and if they are properly organized, adequately staffed and equipped, and if they are not used merely as dumping grounds for unsuitable cases, they will solve one of the biggest difficulties in therapy which the practitioner and the specialist encounter.

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DERMATOSES OF THE MENOPAUSE

By H. W. BARBER, M.B., B.Ch., F.R.C.P.

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A CONSIDERABLE number and variety of cutaneous changes and of symptoms referable to the skin appear in women at the menopausal or post-menopausal periods of life, and at an earlier age in those with ovarian hypofunction. Moreover, certain dermatoses, which may occur from childhood to old age, and in both sexes, may be strikingly influenced, as regards their distribution and clinical features, by the climacteric. The most outstanding examples of these are neurodermatitis and psoriasis. A good deal is known about what may be called the morbid anatomy and pathology of the menopausal and post-menopausal states, and clinically it has been shown that some symptoms may be relieved completely by the judicious administration of oestrogens. There is much, however, that is not clear when an attempt is made to account for the variability of responses to waning ovarian activity, and when the cutaneous signs and symptoms that result are considered this individual variation can be appreciated to the full. Before attempting further discussion it is necessary to consider briefly the effect of ovarian senescence, as Hertig puts it, on the hormonal system as a whole.

Males, after castration or testicular atrophy, suffer from symptoms similar to those that may occur at the female climacteric, for example, hot flushes, sweatings, nervous instability and mental changes, but whether or not men normally pass through a phase in their declining years that is really comparable to it, is doubtful. Although the ageing of the ovaries is a gradual process, as Hertig's (1944) studies show, by the age of fifty follicular activity ceases rather abruptly in the great majority of women. Thereafter they are neuters, and some feel better for it, acquiring to a greater extent than before the male qualities of initiative, self-reliance, and determination. In men there is normally no such definite phase of loss of sexual function, but a gradual change through the advancing years towards true senescence, at which stage there is, from the endocrinological standpoint, little difference between the sexes. According to Engle, more than half of all men over seventy still show active sperm-cell production.

As regards the causation of menopausal symptoms the observations of Severinghaus (1944) on the cytology of the anterior pituitary gland in post-menopausal women would seem of the highest significance, although the author modestly abstained from speculating on the interpretation of his findings.

Pituitary glands from ten women of different ages (thirty-five to seventy-four years) and from nine men (thirty-six to eighty-four years) were obtained and fixed within an hour of death, thus preventing autolysis. A comparison of the male and

female glands of corresponding ages showed striking differences. The anterior lobe of a woman of sixty-five was selected for detailed description, i.e., one long past the menopause and already in the old-age group. The main histological features were:—

(1) All three types of cells—acidophils, basophils, and chromophobes—were present, and the two first, which produce the hormones, were abundant.

(2) Both acidophils and basophils were large, fully granulated, and in various stages of degranulation, indicating active secretory discharge.

(3) The Golgi apparatus of both types was greatly hypertrophied, which may be regarded as an index of elaboration of the cytoplasmic granules. Thus, far from the state of hypofunction that characterizes the anterior pituitaries of senescence, that of this woman had been in one of active secretion. The findings in the hypophyses of the other post-menopausal women were similar, but with variations in the degree of increased activity.

On the other hand, the anterior lobe of a man in a similar age-group presented the features of retrogression and hypofunction. Chromophobes were plentiful, but the granular cells were reduced in number and size, and had lost their earlier compact arrangement, being widely dispersed and separated by an increased amount of connective tissue, colloid vesicles, and clear tissue spaces. The basophils were filled with vacuoles, and neither they nor the acidophils had any of the cytological features that portrayed the functional activity of the female gland.

It is clear, then, that for several years after the menopause the anterior pituitary lobe reveals unmistakable evidence of hyperfunction, in contradistinction to its gradually declining activity in males. In actual senescence the anterior pituitaries of both sexes exhibit the degenerative changes, viz. increase of chromophobe cells and of connective tissue, with vacuolization of the chromophils, that are comparable to those found in rats suffering from extreme inanition.

These observations certainly appear to offer a reasonable hypothesis to account for the female climacteric and for the absence in normal men of a state strictly comparable to it.

If the climacteric be regarded as a physiological castration, albeit only a partial one, the changes observed by Severinghaus and others in the anterior pituitary are comparable to those obtaining in animals after experimental castration. There is the same hyperactivity, with increase particularly of the basophil cells, and consequent overproduction of the "trophic" hormones, so that thyroid and adrenal cortical hyperplasia may result. It is interesting that the effects of castration upon the endocrine system vary somewhat, not only in different species of animals, but also in different individuals of the same species. Thus only about 50 per cent. of dogs become obese (Simpson, 1938). It is therefore not surprising that the results of diminished ovarian activity in women should show similar variations, and this in part may depend upon the degree of reactivity of the adrenals and thyroid to stimulation by the "trophic" hormones.

It has been suggested that the commoner menopausal symptoms—feelings of heat with or without flushings, sweats, chilliness with pallor, nervousness, and mental perturbation—may be caused directly by excess of gonadotrophins, and another theory is that they depend upon the

disappearance or decrease of oestrogens. Fluhmann (1944) has advanced good reasons against acceptance of either theory, and Heller *et al.* (1944) have disproved the former.

It seems more likely that these symptoms, which are indicative of instability of the autonomic nervous system, are of adrenal origin. In fact they, together with the labile hypertension, recall in mild degree those observed in cases of phaeochromocytoma. Certainly the development of virilism—hirsuties with loss of hair on the scalp, seborrhœa, and deepening of the voice—at the climacteric, may be reasonably ascribed to hyperfunction of the adrenal cortex secondary to increased activity of the basophil cells of the pituitary, and cases are met with in which Cushing's syndrome is simulated.

CLASSIFICATION

HYPERTROPHIES

(1) Papillomatosis: (a) Diffuse. (b) Localized. Small papillomas, either flat or pedunculated on "menopausal areas".

(2) Verrucæ seniles, or seborrhœic warts.

(3) Hyperkeratosis: (a) Diffuse and follicular. (b) Keratoderma palmare et plantare climactericum.

ATROPHIES

(1) A generalized atrophic change in the skin, best seen perhaps on the face and neck, and probably due chiefly to diminution of the elastic tissue.

(2) Civatte's pigmented and telangiectatic poikiloderma.

(3) Kraurosis vulvæ

ERUPTIONS ASSOCIATED WITH INCREASED ACTIVITY OF THE SEBACEOUS GLANDS

(1) Pityriasis capitis.

(2) Seborrhœic dermatitis.

(3) Acne.

(4) Secondary seborrhœic infection in association with rosacea.

DISORDERS OF THE GROWTH OF HAIR

(1) Hypertrichosis: Growth of coarse hair of male distribution, on the face, front of chest, around the nipples, on the linea alba, and limbs.

(2) Alopecia of the scalp of male type: (a) non-cicatricial; (b) cicatricial.

DISORDERS OF THE SWEAT GLANDS

(1) Hyperidrosis, localized and diffuse.

(2) Fox-Fordyce's disease.

DISTURBANCES OF THE VEGETATIVE NERVOUS SYSTEM

(1) "Hot flushes".

(2) Rosacea.

(3) Pruritus, prurigo, and neurodermatitis. (a) Generalized. (b) Localized: particularly of the nape and sides of the neck, vulva, groins, and interanal cleft.

(4) Alopecia areata.

Sabouraud recognized "une pelade de la ménopause", whether the menopause was natural or artificial. He noted that the most serious cases were those in which the menopause had been artificially produced.

(5) Vitiligo.

(6) Circumscribed scleroderma (morphœa).

I have seen a few cases of morphœa, occurring at about the time of the menopause, in which œstrogens had a remarkable effect. In two—similar in that the morphœa was situated on the lower part of the left leg—severe reactions in the patches occurred. They became intensely congested and swollen, and in one case a granulomatous condition with serous discharge developed. These reactions subsided, and with further treatment the patches became more vascularized and softer.

NON-SPECIFIC ERUPTIONS THE ONSET OR LOCALIZATION OF WHICH MAY BE DETERMINED BY THE MENOPAUSE OR OVARIAN DEFICIENCY

(1) Urticaria.

(2) Angioneurotic œdema.

(3) Eczema.

(4) Psoriasis.

VIRUS INFECTION

(1) Herpes simplex.

Two groups of cases can be recognized:—(a) in which recurrent herpes, often beginning in adolescence, occurs just before or during the menstrual periods; (b) in which recurrent attacks begin for the first time at or soon after the climacteric, and tend to involve the vulva and adjacent parts, and the buttocks and upper thighs. I have had several cases of (1) in which the administration of œstrogens prevented the attacks. In (2) my results have been doubtful in the few cases I have had.

(2) Recurrent buccal and vulval ulcers (Lipschutz type).

This has not been proved to be a virus infection, but it seems likely. There appears to be an undoubted relationship to ovarian function, and œstrogenic therapy in one severe case had a markedly beneficial effect, but was not completely successful.

THE MENOPAUSAL AREAS

There are certain situations on the skin, which I have termed the menopausal areas, that are particularly prone to involvement by these conditions. They are:—

The pubic region, groins, vulva, and internatal cleft; the areolæ of the nipples; the submammary folds; the axillæ; the antecubital fossæ; the nape and sides of the neck; the eyelids; the rosaceous area of the face; and the palms and soles. Distribution on one or more of these areas is well illustrated by the small flat or pedunculated papillomas, neurodermatitis, localized hyperidrosis, the Fox-Fordyce disease of the apocrine sweat glands, keratoderma climactericum, seborrhœic dermatitis, eczema, and psoriasis.

From the therapeutic aspect it is of particular importance to recognize this localization in the last two diseases.

PAPILLOMATOSIS

One of the most common and most intriguing cutaneous lesions that may legitimately be associated with the climacteric is the small papilloma, although it may occur in both sexes and at other periods of life. It

has, however, received little serious attention. Under the term "akrochordon" or fibroma simplex it was apparently confused by older authors with molluscum fibrosum. Templeton (1936), however, has given a clear and illuminating description of it, and he showed by experimental inoculation of a filtered extract that it is not a wart.

Two types are met with: small sessile papules which predominate and are of the colour of normal skin or sometimes darker, and pedunculated filiform "tags" resembling filiform warts. Careful observation under a lens will show that their formation is preceded by *diffuse* papillary hypertrophy, which passes imperceptibly into the production of the minute early papules.

Templeton rightly stated that they occur most commonly on the lateral and anterior aspects of the neck in middle-aged women, but the only other site he mentions is the chest. They may frequently be found, however, sometimes in large numbers, on other menopausal sites, namely the submammary folds, the axillæ, the antecubital fossæ, the umbilicus, and the groins, and sometimes on the lateral aspects of the cheeks. In a considerable proportion of cases they coexist with the misnamed "verruçæ seniles" or "seborrhœic keratoses", and it may be difficult to distinguish them clinically from the smallest of these when they involve the same sites.

Careful observations on a large number of persons of both sexes and at all ages, and particularly of cases of established endocrine disorder and of pregnancy, are required before useful speculation on the causation of these papillomas. The main points I would make concerning them are:—

(1) They are, as Templeton states, commonest and most numerous in middle-aged women, but they may occur in considerable numbers in the third decade.

(2) They are seen in males, but in my experience usually at a later age, less commonly, and more sparsely.

(3) Like "verruçæ seniles" they may disappear in women after treatment with œstrogens, but I have found that either relatively large doses or long-continued administration are necessary.

(4) In a man of sixty-eight, in whom many were present in the axillæ and on the sides of the neck, treatment with linguets of methyl testosterone (15 mgm. daily) for one month was followed by the disappearance of the majority.

(5) They were found in large numbers and with a wide distribution in an acromegalic woman recently examined.

(6) In a young man of twenty with seborrhœic dermatitis, also seen recently, a few were present on the neck and in the axillæ.

There seems little doubt that the small growths, described by Brickner (1906, 1912) and others as "fibroma molluscum gravidarum", are of the same nature with the same distribution (neck, breasts, and submammary region). Templeton did not observe any in twenty-three pregnant women examined.

KERATOSES

(a) *Diffuse and follicular hyperkeratosis*.—This condition has received little recognition, although, when well developed, the appearances are striking.

I have seen it only in women. It occurs on the face and upper part of the neck. There is follicular and interfollicular hyperkeratosis, so that the skin has a granular appearance and is rough to the touch. The mouths of the pilo-sebaceous follicles may be filled with minute whitish plugs of keratin. Often there is some reddening of the affected areas, and I have under observation a few remarkable cases in which the condition is associated with a telangiectatic and pigmentary change, identical with or comparable to that described by Civatte (1923) as occurring chiefly in women of menopausal age. In one of these cases there is also present an enormous number of small "verrucae seniles". I have been impressed by the relative frequency with which this form of hyperkeratosis affects women in whom an artificial menopause has been produced by radium or ovariectomy.

(b) *Follicular keratosis*.—Associated with (a) or independently of it may be seen horny plugs in follicular orifices. They are drier than comedones, of a lighter colour, and easily expressed. They occur most commonly, perhaps, on the temples and posterior parts of the cheeks, but may be seen also on the extensor surfaces of the arms and elsewhere. Although observed in women in the fourth and fifth decades, they are met with also in men at a later age. They may be numerous in the degenerated skin of chronic solar dermatitis (tropical skin).

(c) *Verrucae seniles, seborrhæic keratoses or "warts"*.—The names applied to these very common lesions are unfortunate. The term "senile warts" leads to confusion with true senile keratoses, which are classed among the precancerous dermatoses, and there is no real association with seborrhæa. Like the papillomas, they tend to appear in the fourth decade, sometimes earlier, but become more numerous with increasing age.

They vary greatly in number, size and colour. Pale yellow when small, they darken and may be almost black when fully developed. They are covered by horny, greasy-looking scales, removal of which exposes a granular, warty surface, which bleeds easily. Their distribution is in part rather different from that of the papillomas, for although with them they may involve some of the menopausal areas, they occur widely on the flanks, abdomen, chest and back, and less commonly on the neck, cheeks, and temples. Their histology varies according to the stage of development. There is irregular hyperkeratosis with epidermic cyst formation, and increased pigmentation in the basal layer.

These lesions and the papillomas may in future attract more serious attention from pathologists and endocrinologists. Quite distinct from each other, although often coexistent, particularly in women, they have hitherto been regarded as late naevi; yet both may disappear completely under the influence of the sex hormones. Garb and Wise (1943) reported a case of bullous mycosis fungoides in a man of sixty-seven, in whom injections of testosterone propionate were followed by the steady disappearance of numerous "seborrhæic warts" present on the back. In a few males under my care subcutaneous implantation of testosterone by Dr. Bishop was also followed by their complete or partial disappearance. In several female patients I have watched them gradually fade, leaving faint brown stains,

under the influence of œstrogens given orally, and in others after subcutaneous implantation of œstradiol. One illustrative case may be cited:—

A patient, aged sixty-one, consulted me on May 5, 1944, for what proved to be a contact dermatitis. Her skin as a whole was dry and "rough". Numerous verrucæ seniles were present on the back and under the left breast. On the backs of the forearms and on the right temple were follicular keratoses. She was ordered hexœstrol, 5 mgm. daily, and was seen again on September 19. Several of the verrucæ seniles had disappeared, and the follicular keratosis was less evident. The dose of hexœstrol was reduced to 1 mgm. daily, but a month later she reported uterine bleeding, and was advised to stop treatment. When seen again on February 14, 1945, she was ordered hexœstrol 0.5 mgm. daily, and this was continued until her next visit on January 8, 1946. The change in her skin was striking. Its texture was smooth and flexible. Nearly all the verrucæ seniles on the back, and most of those under the breast, had faded completely. Only a very few of the follicular keratoses were still visible on the forearms.

The presence of verrucæ seniles, which are extremely common after middle-age, is not in itself, of course, an indication for treatment with œstrogens or testosterone. Only if they are very numerous and disfiguring should such treatment be considered, unless other more important indications be present. Unlike true senile keratoses, they rarely become epitheliomatous. They can be conveniently removed by refrigeration with carbon dioxide snow. They are unresponsive to radiotherapy. Figures 1, 2 and 3 are from a patient with (a) the pituitary type of obesity, (b) keratoderma of the hands and feet, (c) papillomas of the neck and in the submammary folds, and (d) verrucæ seniles on the trunk (*see* page 340 and plate).

(d) *Keratoderma climactericum*.—This condition of the palms and soles, although relatively uncommon, is one of the best-defined cutaneous changes occurring at the climacteric, or earlier in cases of ovarian insufficiency. Brooke (1891) could probably claim priority of description under the title "Erythema Keratodes of the Palms and Soles". His first patient was a woman of forty-seven years with nervous symptoms, which he attributed to the approaching climacteric. Dubreuilh (1892) later described a case, but it was not until Haxthausen (1934) reported ten examples of what was doubtless the same eruption under the title of *keratoderma climactericum* that it received much attention. I had shortly before this described (1934) a similar symmetrical hyperkeratosis of the palms and soles, occurring in both sexes and accompanied by a raised uric acid level in the blood. Later I suggested that these cases fall into two groups, one in which the keratoderma is a menopausal symptom, and the other—chiefly males—in which it is a manifestation of gout. Goldsmith (1936) refers to one female case in which it responded well to cinchophen.

The main clinical features of *keratoderma climactericum* are the occurrence of hyperkeratotic plaques with erythematous bases on the palms and soles, at first circumscribed, but later becoming more diffuse and confluent. As with gouty hyperkeratosis, the patches are most evident at sites of pressure, and they may occur on the backs of the hands and over the patella (fig. 4 and 5; *see* plate facing page 341). With increased thickening of the horny layer, painful fissures are apt to form. Apart from these, the patients often complain of burning and itching, particularly at night time, and there may be eczematization without visible vesicles.

Haxthausen emphasized the frequent association of the eruption with the post-climacteric triad of Gram—obesity, arterial hypertension, and arthritis—but I have met with the complete syndrome only occasionally, although other symptoms and signs of the climacteric are commonly present. In an excellent paper, based upon his observations in ten cases, Lynch (1943) discusses the differential diagnosis, particularly from neurodermatitis, and fully describes the micropathology. The ages of his ten cases

varied from twenty-nine to sixty-two years, but in seven of them they lay between fifty-two and sixty-two, i.e., the later phase of the climacteric. It is important, however, to recognize that the condition, as with other "menopausal" symptoms, may be met with in comparatively young women.

Bishop and I (1937) reported a case in which the condition disappeared quickly with a daily dose of 1 mgm. oestradiol orally. It relapsed when this was discontinued, but responded again when treatment was resumed.

Goldberg (1939) successfully treated a patient with bi-weekly injections of an oestrogen combined with local radiotherapy. Garbe (1944) also reports good results in two cases treated by parenteral and oral administration of stilboestrol.

Since our first case was described, Bishop and I have observed the effects of oestrogenic therapy in several more. As in other conditions, responsiveness varies strikingly in different cases. In some, small doses of a synthetic oestrogen given orally are successful; in others a much higher dosage is necessary. When menstruation has ceased for some time past, and when an hysterectomy has been done, subcutaneous implantation is the method of choice. In one patient, for example, after an implantation of 100 mgm. of oestradiol, the keratoderma rapidly disappeared, and did not relapse for eight months. Subsequent treatment with dien-oestrol, 1 mgm. and later 2 mgm. daily by mouth, over a period of three months, had no effect.

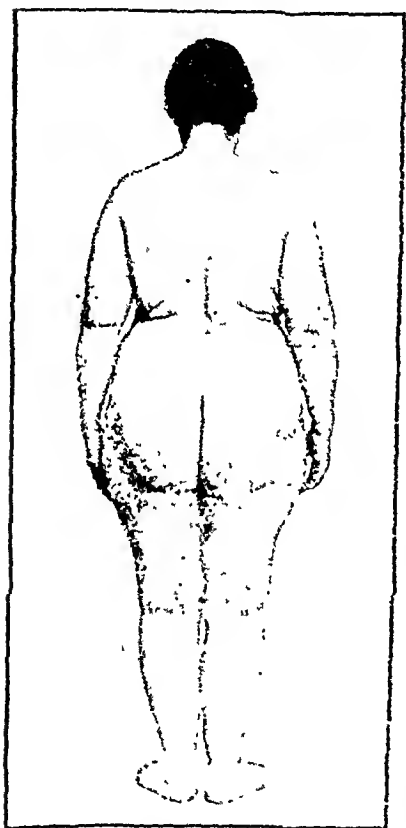
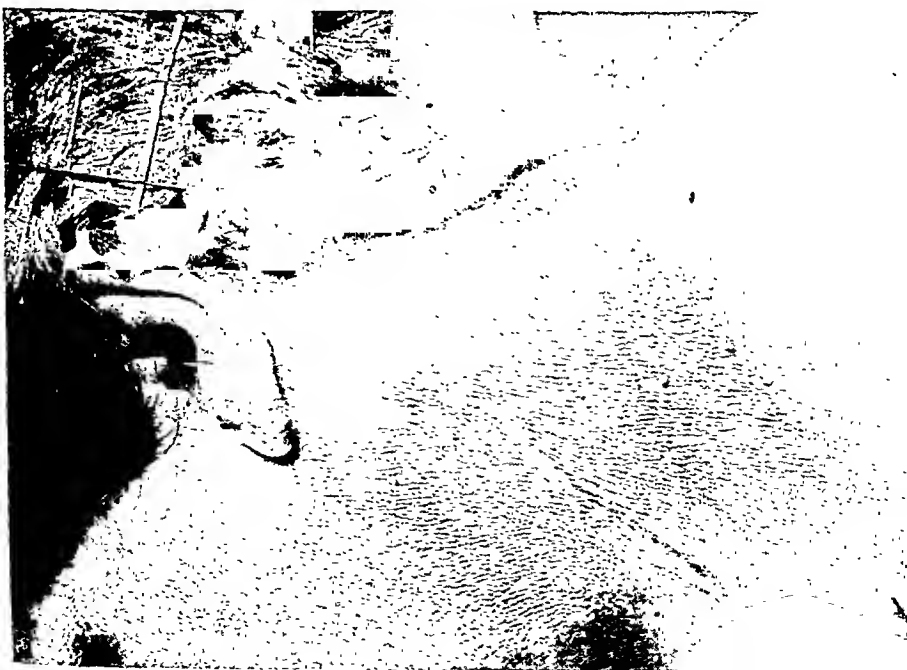
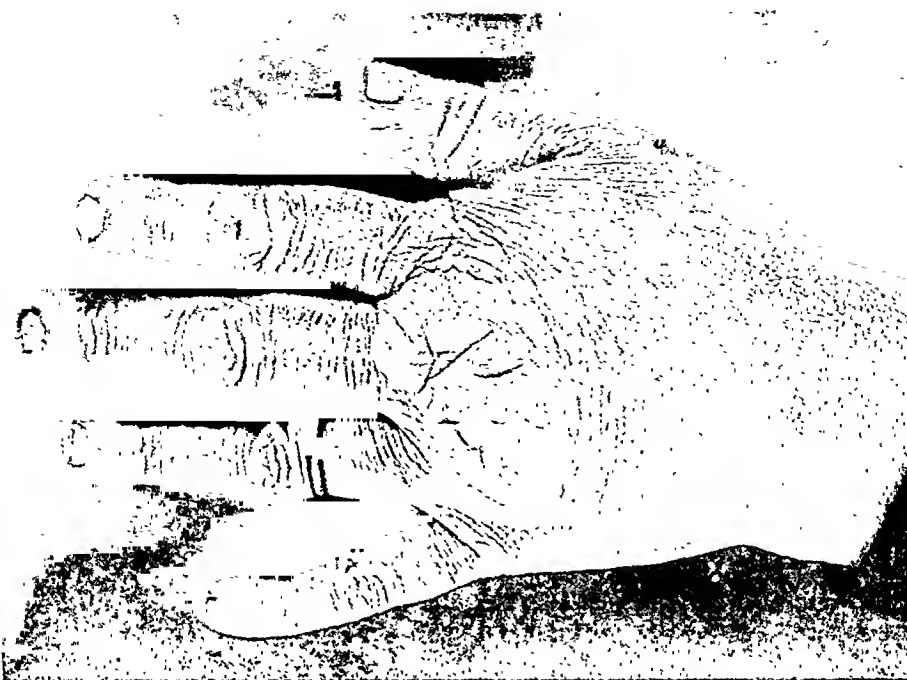


FIG. 1.—The pituitary type of obesity. Showing the deposits of fat on the upper arms, the subscapular regions, and the "riding-breeches" area, with the relatively slim forearms and legs.

It is clear that these structural changes in the skin that occur in and after middle life are degenerative in character. In the epidermis the most striking feature is hyperkeratosis, slight and usually confined to the follicles in the papillomas, and reaching its maximum in keratoderma climactericum. In the dermis, perhaps the most significant finding is



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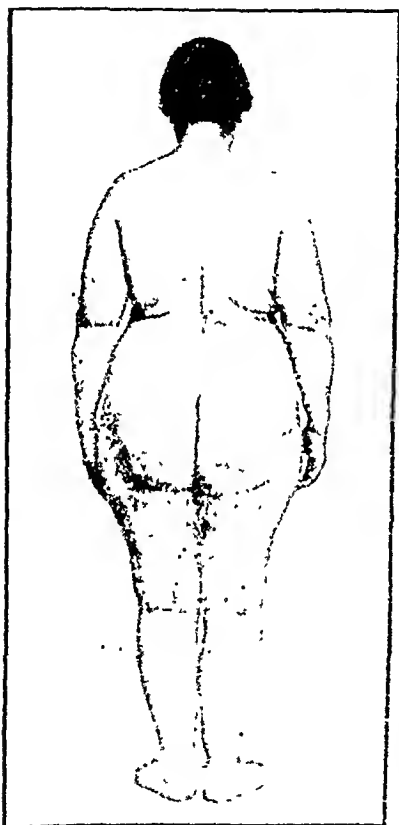


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degeneration of the elastic fibres. That such changes can be influenced by the sex hormones is of great interest, but further observations on the histopathology of the various lesions before and after treatment are obviously needed.

SEBORRHŒIC ERUPTIONS

Etiology.—Although not universally accepted, Sabouraud's original views may be summarized as follows:—

<i>Organism</i>	<i>Dermatosis</i>
Pityrosporon of Malassez	Pityriasis capitis, "dandruff", scurf
Pityrosporon of Malassez in symbiosis with the <i>Staphylococcus albus</i>	Seborrhœic dermatitis
Acne bacillus	Comedo or "blackhead"
	One form of acne pustule
	One form of acne pustule
<i>Staphylococcus pyogenes albus</i>	Superficial follicular pustule

In rosacea, infection of the flush area is usual, and all of the above organisms, as well as a *Staphylococcus aureus*, may be concerned in producing the secondary eruption.

Of more importance is the endocrinological basis of seborrhœa and its infective complications. Excluding post-encephalitic seborrhœa, it may be said that the activity of the sebaceous glands depends upon the ratio between androgenic and œstrogenic influence on the skin. Androgens stimulate the glands and predispose to the seborrhœic eruptions; œstrogens have the opposite effect. In eunuchs and eunuchoids sebaceous activity is minimal, but under treatment with testosterone they develop visible seborrhœa, beginning as at puberty on the nose and adjacent parts of the cheeks, and this may be followed by comedo formation and acne pustules, which disappear when treatment is withheld. Conversely, even in males with intense seborrhœa and severe acne, adequate doses of œstrogens damp down sebaceous secretion. The skin becomes smooth and the pilo-sebaceous follicles less visible, the comedones shrivel and may easily be picked out with the finger nail, and the pustules and cysts dry up and cease to form. Moreover, with the diminution of the seborrhœa on the scalp, dandruff decreases or disappears.

In view of these facts it is not surprising that, with the diminishing ovarian activity and, in some cases at any rate, the increased formation of androgens from the adrenals that occurs at the climacteric, seborrhœic eruptions tend to develop, often with the growth of coarse hair on the face and elsewhere. Frequently the patient has had acne, dandruff or seborrhœic dermatitis in earlier life, which have disappeared after marriage and child-bearing; in others these may develop for the first time at the menopause.

Symptoms.—The first symptom may be increasing scurfiness of the scalp with fall of hair, chiefly, as in the male, on the vertex and temples. Thence the infection may spread as a seborrhœic dermatitis to the retro-



FIG. 4.—Keratoderma climactericum in a single woman aged fifty-three. The keratoderma appeared on the feet two years after cessation of menstruation and on the hands six months later. Highly satisfactory response to implantation of œstradiol



FIG. 5. Keratoderma of the right hand and face, involving the thumb over the pollex and interphalangeal joint

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auricular spaces, the meatuses, the rosaceous area of the face and the eyelids, the sides of the neck, the axillæ, the submammary folds, the umbilicus, and the pubic region, groins, and internatal cleft. In these menopausal cases of seborrhœic dermatitis the inflammation may be intense, with eczematization and serous oozing, and itching is almost always severe, so that from rubbing and scratching the eruption becomes lichenified, and a secondary neurodermatitis is engrafted on the primary eruption.

Thus there arises a syndrome that is characteristic and not uncommon, although frequently misunderstood. The eruption, involving some or all of the areas mentioned, is subject to periodical acute exacerbations with œdema and serous discharge. On the face the clinical appearances and the œdema of the eyelids simulate a contact dermatitis, and some causative irritant is sought in vain; or a diagnosis of "eczema" of unknown origin is made. In other cases, apart from dandruff, the only seborrhœic eruption is that affecting the central area of the face when rosacea is present. Often it consists of scaly patches, a few comedones, and pustulation of varying intensity. Conversely, there may be no rosacea, but only indolent acne papules and pustules on the chin, sometimes with growth of coarse hair on the upper lip and along the lower jaws. The importance of recognizing the influence of the climacteric in the genesis of these seborrhœic eruptions is that, no matter what other factors, such as gastric dyspepsia, unsuitable diet, and psychological disturbances, may be present and should be corrected, treatment with œstrogens is not only rational but of great value.

PRURITUS, PRURIGO AND NEURODERMATITIS

Although I have classified these symptoms among disturbances of the vegetative nervous system, I do not imply that itching is caused by excitation of autonomic nerve fibres. It is, however, often associated with evident derangement of the endocrine-autonomic system. Goldsmith (1936) has fully discussed this problem.

Generalized, or more commonly localized, pruritus is a frequent symptom at the climacteric, and scratching provokes varying responses in the skin, the most characteristic of which is lichenification, in which the affected area of skin is thickened, and the natural lines are exaggerated, producing a mosaic appearance. The interstices of the mosaic are formed by flat, smooth, glistening papules, resembling those of lichen planus. Similar minute and discrete papules are seen in the outer zone of the patch, which is ill-defined. Hyperpigmentation, which extends beyond the borders and may be intense, is usually seen, and sometimes areas of depigmentation appear in patches of long standing. Localized sweating is also common.

Lichenification may be primary, in that it results from scratching of previously normal skin, or it may be secondary and superimposed on some preceding eruption, such as eczema, seborrhœic dermatitis, or psoriasis. When primary, it constitutes the entity *neurodermatitis*, which may be

widespread, or localized to one or more sites (circumscribed prurigo, lichen simplex chronicus). In certain subjects only does this characteristic response to scratching obtain, whether it be primary or secondary. It is constant in the eczema-prurigo of those liable to multiple "allergic" symptoms (eczema; prurigo; asthma; rhinorrhœa; migraine syndrome). It also occurs in anxious, worrying persons of both sexes, or as a sequel to adrenal-sympathetic exhaustion from overstrain or acute and chronic infection. It seems probable that lichenification is associated with the vagotonic state. Sufferers from the "allergic" syndrome are the vagotonics *par excellence*, and in my experience, although pruritus is common in sympathicotonia and thyrotoxicosis, lichenification seldom, if ever, occurs.

Neurodermatitis is one of the most common of all menopausal or post-menopausal symptoms, and may be indicative of ovarian deficiency in young women. Even so, however, the anxiety state is almost always an additional factor. It is often primary, but may, as I have said, be secondary to some pre-existing eruption. It involves one or more of the menopausal areas cited above, but the most characteristic site, perhaps, is the nape of the neck, since here it is almost peculiar to women. As might be expected, the vulva, pubic region, groins and internatal cleft are especially susceptible. Lichenification of the vulva is sometimes mistaken for leucoplakia or even for kraurosis. Although in the majority of cases neurodermatitis of the menopause responds satisfactorily to fractional doses of X-rays or thorium-X, combined with sedatives, rest, change of environment and psychotherapy, relief is usually temporary unless an œstrogen is given. When itching has entirely ceased, it is advisable to give a small maintenance dose with intermissions. I have found that under its influence the patient is enabled to cope more effectively with the domestic and environmental difficulties that are usually present in these cases.

NON-SPECIFIC ERUPTIONS

I can discuss these only briefly, although the undoubted influence of the climacteric upon them is an interesting problem.

Urticaria, *angioneurotic œdema*, and *eczema* are associated with retention of fluid and its mobilization in the dermis, subcutaneous tissue, and epidermis respectively. A comparable symptom is *migraine*, which is also accompanied by fluid retention. Attacks of all these conditions are apt to appear at the menopause, as well as just prior to menstruation, when fluid retention occurs even in normal women.

Eczema, at and after the climacteric, often involves chiefly the menopausal areas, and in particular the pubic region, vulva, groins, upper thighs, internatal cleft, and submammary folds. An interesting feature is that periodically—frequently after emotional disturbances which are known to provoke fluid retention—sudden attacks of oozing occur, so that the clothing becomes drenched with serum. Itching is intense, but is often more severe after the subsidence of an attack, and a secondary neurodermatitis almost constantly results from frantic scratching. Some of these patients have previously suffered from eczema and other allergic

symptoms, in which case, as in a patient seen recently, with the approach of the climacteric the eczema tends to shift to one or more of the menopausal areas. In other instances it may be a new symptom. As with simple neurodermatitis, the anxiety state is commonly a feature of these cases.

Psoriasis.—Although some authors have suggested that psoriasis is due to a specific virus infection, the balance of evidence is in favour of its being a non-specific reaction of the skin, allergic in nature. This cannot be discussed here, but the relationship of psoriasis to the rheumatic diseases is evident (Barber, 1938). In childhood there is often a close association with rheumatic fever and with streptococcal infection of the throat (Hunt, 1933, 1938). In adults, psoriasis arthropathica, in which the arthritis is of the rheumatoid type but with certain special features (Garrod and Evans, 1924), is a well-recognized syndrome, and in other cases there is a clear association with gout, which, when a secondary osteoarthritis of the smaller joints results, may produce an equally characteristic clinical picture. Finally, menopausal psoriasis may be correlated with menopausal arthritis or arthrosis, although the two do not necessarily coexist. Just as the arthritis may develop even in the third decade after an artificial menopause, so may psoriasis with a menopausal distribution in cases of ovarian insufficiency, but both are naturally more frequent at or after the normal climacteric.

As with eczema of the climacteric, the patient with menopausal psoriasis may have previously had the disease, in which case the distribution changes, or it may appear for the first time and affect predominantly one, or more of the menopausal areas, most commonly the vulva, groins, internatal cleft, and submammary folds, where it is frequently wrongly diagnosed as a mycotic intertrigo. Itching, which is usually absent or slight in psoriasis of childhood and the prime of life, is almost constantly severe, and painful fissures form in the axes of the folds. I have observed several cases in which psoriasis replaced, so to speak, neurodermatitis of the nape of the neck or keratoderma climactericum, and responded in the same way to treatment with oestrogens. It may also select the rosaceous area of the face in place of the more usual seborrhœic infection.

It is difficult to understand why the climacteric should thus influence the localization of two such common diseases as eczema and psoriasis, and indeed in some cases apparently determine their first appearance. It seems probable that the decline in oestrogen production, either directly or indirectly, renders vulnerable those parts of the skin that I have termed the menopausal areas, and that they respond in different fashion according to differences of reaction in the individual—the anxious person developing neurodermatitis, the psoriatic psoriasis, and the seborrhœic person infected with the seborrhœic organisms. In all these conditions, whatever other measures the case may demand, oestrogens in carefully controlled dosage are of value.

There is a condition affecting the eyelids, which I described several years ago (1934), but which is difficult to classify, since the reaction in the

skin varies. The patient complains of recurrent attacks of "swelling" of the lids, associated as a rule with intense itching. The attacks admittedly follow emotional disturbances, a sleepless night, or fatigue. There is œdema, which may be present alone, or may be accompanied by erythema, and sometimes by eczematization. As with eczematized seborrhœic dermatitis of the lids, the history and appearances may suggest a contact dermatitis, but there is one feature that is pathognomonic, namely the sharp limitation to the eyelids of the œdema, or, when present, of the erythema and eczematization. The sharp margination recalls that seen in one form of eczema of the nipples, in which the exact area of the areolæ is alone involved.

In my description of this condition of the eyelids, I wrote "The patient is usually a highly strung woman, manifesting obvious signs of the anxiety state, and questioning will, as a rule, disclose either a long period of worry or stress, an acute infection from the effects of which she has not recovered, or more commonly some source of domestic unhappiness".

Nearly all my patients have been women at the climacteric period, but I have seen one male case.

TREATMENT

Some physicians, endocrinologists and gynæcologists take the view that the climacteric with all its possible disturbances is a natural process, which must be endured with fortitude. They claim that the disharmony of the endocrine and autonomic nervous systems that tends to occur at this time, as at puberty, will right itself, and that the patient, relieved of the nuisance of menstruation and of the pain and anxieties of child-bearing, should look forward to a serene old age. They discourage the use of œstrogens except as a grudging concession for the relief of flushings, sweatings, and emotional outbursts, which are almost the only symptoms they recognize.

This view is reasonable in the case of women whose symptoms are slight or transitory, but in many readjustment does not take place, evidence of overactivity of the pituitary persists, as might be expected from the observations of Severinghaus, and in the skin various changes occur for which they naturally demand treatment. Administration of œstrogens under constant supervision is then rational, if not imperative. In many cases, even in women long past the menopause, the results of treatment both on the condition of the skin and on symptoms such as hypertension and the anxiety state may be striking. After considerable experience, however, I find it impossible to formulate any definite rules for dosage, or to forecast the response to be expected in a given case. The following remarks are therefore made with reservations.

(1) The approaching menopause is not necessarily an indication for œstrogenic treatment, and it must be remembered that, preceding ultimate cessation of follicular activity, there may be a period of excessive œstrogen formation.

(2) As regards the mode of administration there is little doubt that implantation under the skin of œstradiol or one of the synthetic œstrogens

is more effective than other methods; it is contraindicated, however, if the patient is still menstruating, or has only recently ceased to do so; it is the method of choice in the later stages of the climacteric, and if the uterus has been removed for fibroids or other reason.

(3) Intramuscular injections are theoretically preferable to oral medication, and are advisable if a rapid or intense effect is desired.

(4) In the majority of cases the oral route is chosen for convenience and is reasonably satisfactory, although an obvious objection is that it is not possible to estimate how much is absorbed or reaches the tissues in an active state. Another difficulty is that it is not always possible to know with certainty which of the multiple symptoms depend upon oestrogen lack and which upon pituitary overactivity. The observations of Heller *et al.* (1944) suggest that, to affect the latter, relatively large doses, e.g. 5 mgm. daily of stilboestrol, must be given, at any rate at first. As regards the various cutaneous disorders described, I aim at giving the smallest dose necessary to produce a visible result when employing oral medication, and there is no evidence that small doses given over long periods produce any harmful effects. Karnaky (1945), in fact, concludes that even large doses of diethylstilboestrol "may be used without fear of serious consequence". Now that ointments containing an adequate concentration of synthetic oestrogens are available, it is likely that for some dermatoses oral and parenteral administration will prove to be unnecessary.

I wish to express my gratitude to Dr. P. M. F. Bishop, whose knowledge and unselfish collaboration have been most valuable to me. I am also indebted to Dr. W. Freudenthal for his interest in this subject and helpful advice.

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URTICARIA AND ITS TREATMENT

By BERNARD C. TATE, M.B.E., M.D., F.R.C.P.

Physician to Skin Departments, Birmingham United and Children's Hospitals.

THE urticarial weal, so familiar that it needs no description, is a normal response of the skin to injury, and obviously therefore may be evoked by many different agents. The damage inflicted on the skin cells may differ in kind and degree, but the final train of events results from the same cause—a rapid liberation from the damaged cells of a chemical compound, H-substance, which is either histamine or closely related to it (Lewis, 1927). H-substance produces dilatation and increased permeability of the capillaries in the area of its liberation and, through a local axon reflex, dilatation of the arterioles over a somewhat wider area. Dilatation of the arterioles causes an increased pressure and flow of the blood in the dilated and permeable capillaries, and serum is forced through their walls, producing local swelling. Usually, although not invariably, the exudate eventually compresses the capillaries so that the swelling becomes white, the well-known urticarial weal. Angioneurotic oedema is probably a variant of this reaction and will not be considered separately.

EXCITING AGENTS OF URTICARIA

Examples of *local injuries* producing weals are nettle stings, light freezing with CO₂ snow, and a smart blow with a cane or whip-lash. The amount of trauma necessary for weal production varies in different parts of the body and in different persons, some subjects, usually of a neurotic temperament, reacting even to a firm stroke with a pencil (dermographism); and, a point of legal interest, the presence of weals on a child after a recent caning is no proof of undue severity.

ALLERGENS.—In the ordinary case of urticaria, however, the stimulus causing release of H-substance comes from within. In many, perhaps most, instances the agent, not necessarily of a toxic nature, reaches the skin through the blood stream, producing its effects by an allergic reaction. This is best explained by assuming the formation in the skin of a substance (the antibody) which combines with the offending agent (the allergen), and this chemical reaction injures the skin cells, with consequent liberation of H-substance. The severity of the injury depends upon the amount of energy liberated by the allergen-antibody reaction, which is probably a reversible one governed by the law of mass action; so that the more antibody there is in the skin, the smaller will be the amount of allergen required to produce damage, i.e., the more highly sensitized is the patient (Tate and Klorfajn,

1944). Some of the antibody may become detached from the skin, appearing in the blood stream, and its presence can be detected by injecting the serum into the skin of a normal person and then applying the allergen to the site through a scarification, when wealing occurs (Prausnitz-Küstner reaction), or wealing may occur at the site when the allergen is ingested.

Allergens may enter the blood stream from several sources:—

(1) *From the skin itself.* The weal produced by an insect bite results from a local allergic reaction, the allergen being directly introduced into the skin, but a minute amount of the allergen enters the blood stream and may, in highly sensitized persons, cause generalized urticaria. I have seen many examples of urticaria caused by scabies, and a few due to fungus infection of the feet.

(2) *From the alimentary canal.*—(a) Foods: It is commonly believed that only proteins can act as allergens, but I have known urticaria cured by excluding certain fats and, in one instance, sugar from the diet, although whether these were examples of allergy to the foods, or whether the cure resulted from an altered metabolism, is not certain. (b) Drugs: quinine, sodium salicylate, bromides, phenolphthalein, sulphonamides, and many others. (c) Soap used in enemas. (d) Substances derived from intestinal parasites. (e) Products of bacterial putrefaction.

(3) *From inhalation.*—Pollens, paint fumes, tobacco smoke, and probably other substances.

(4) *From the urinary tract.*—*B. coli* infection is a well-known, although rare, cause of urticaria.

(5) *From tissue breakdown.*—Urticaria sometimes follows, in about nine to twelve days, a deep-seated ecchymosis due to trauma (Whitfield, 1921). Presumably, antibodies are formed against the patient's own tissue products, i.e. autosensitization occurs. The same phenomenon probably accounts for the urticaria which occasionally accompanies, and is apparently caused by, breaking down of neoplasms and of tuberculous glands, Hodgkin's disease, leukaemia, malaria and, the commonest and most important example, septic foci.

(6) *From ruptured hydatid cysts.*

(7) *From serum injections.*

These allergens may be regarded as foreign to the body, but conceivably antibodies might be formed which react with normal metabolites. The rare cases in which urticaria occurs only at menstruation and those due to exposure to ultra-violet rays could be explained in this way.

Urticaria from *exposure to cold* is thought to be caused by a dermolysin which unites with the skin cells at low temperatures and, on rewarming, lyses them, liberating H-substance (Harris, Lewis and Vaughan, 1929).

Emotion is a well-known cause of urticaria, especially in women. In these cases, heat, physical exertion, and injection of pilocarpine also cause urticaria, and weals can be produced by introducing acetylcholine compounds into the skin electrophoretically. The eruption seems to be caused by normal impulses reaching the skin through certain cutaneous, probably cholinergic, nerves of the posterior root system. (Grant, Pearson and Comeau, 1936). Why the skin reacts in this abnormal fashion to normal impulses is unknown. Possibly antibodies are formed to some substance, presumably acetylcholine, which is liberated at the nerve endings, although this suggestion is discounted by the discovery that weals may be produced in apparently normal women by introducing choline derivatives into the skin electrophoretically (Lewis, 1944).

PREDISPOSING CAUSES

Foreign sera, hydatid fluid, and certain foods are especially apt to stimulate the formation of antibodies, and do so in apparently normal persons. Frequently, however, a tendency to urticaria resides in the patient and to this several factors may contribute:—

(1) The *allergic diathesis*, that curious inborn hereditary tendency to sensitization.

(2) *Psychological disturbances*, especially anxiety and failure of adjustment to difficult or unpleasant circumstances. Not only do these conditions contribute to urticaria produced by emotional stimuli, but also seem in many cases to constitute the most potent factor causing sensitization to chemical allergens; their mode of action is obscure.

(3) *Septic foci* and other *infections*.—Besides sometimes supplying the allergen, septic foci seem to enhance the tendency to sensitization to other allergens. Acute infections, such as colds and tonsillitis, may do the same, but because they are transitory they have less chance.

(4) *Endocrine disorders*.—Hyperthyroidism is common in urticaria, especially in women, although it may be an associated symptom of an underlying mental state rather than a genuine contributory cause; occasionally hypothyroidism is found. Normal endocrine activity, such as menstruation and the menopause, may also aggravate urticaria.

(5) *Gastro-intestinal disorders*.—Some abnormal food fraction may be absorbed as a result of incomplete digestion due to deficiency of gastric or other digestive secretion; or increased permeability of the gut wall to undigested food may ensue from inflammation or vitamin deficiency. A defect in the deaminizing or detoxicating function of the liver is possibly a factor in some cases, although tests of liver function commonly employed rarely reveal any significant abnormality.

TREATMENT

Discovery of the exciting and predisposing causes may be easy, but often requires a detailed inquiry into the history and habits of the patient, complete physical examination, X-rays of teeth and sinuses, and laboratory investigation of the gastro-intestinal functions, urine and faeces; even then the causes sometimes elude detection.

Treatment of *predisposing factors* must never be neglected, for although an allergen be discovered and removed, if the tendency of the patient to form antibodies remains, subsequent sensitization to something else is not improbable. Further, if this tendency persists, specific desensitization treatment is unlikely to succeed, and may indeed make matters worse. Conversely, if the disposition of the patient to form antibody is removed, desensitization will result even if the allergen is not discovered, for its continual presence will eventually neutralize the antibody already formed.

Psychological disorders, when present, usually become obvious during interrogation of the patient. Expert treatment may be necessary, but often a simple explanation to the patient of the relation of the urticaria to the upset of the mind results in disappearance of the eruption, even though the circumstances responsible for the mental state cannot be altered. In my experience phenobarbitone is a most useful adjuvant treatment.

In the search for *septic foci* attention is naturally directed first to the teeth and upper respiratory tract, but other possibilities, such as an infected prostate or cervix uteri, should not be forgotten. Evidence of sepsis must be reliable: wholesale extraction of teeth showing slight pyorrhœa, for instance, is not justified. When removal of a septic focus is impossible, penicillin or one of the sulphonamides may sometimes solve the problem.

Investigation of *the digestive functions* is advisable in cases of sensitization to several foods, and even if laboratory facilities are not available it is worth while trying administration of dilute hydrochloric acid and pepsin or, if that fails, pancreatic enzymes. Such cases, however, are relatively rare and the diagnosis, often made by patients, should be accepted only after strict proof. The best test for food sensitivity is a period of complete starvation, except for water, with the patient in bed, a purge being given at the start to remove residual food from the intestine. If food is the cause, no fresh weals should appear after three or four days and the diet is then gradually built up until a fresh outbreak occurs, when the last food is incriminated. Omission of this suspected food should, if it is really to blame, result in disappearance of the eruption. If there is no appreciable amelioration of the condition after three days' starvation, food can be exonerated. Urticaria produced by emotion may, of course, disappear under this regimen, but it recurs with subsequent exertion. Occasionally, patients recover during starvation and remain well, even though the diet is built up to its former content and normal activities are resumed.

SPECIFIC TREATMENT.—Specific treatment consists in removal or avoidance of the exciting agent or, in the case of pollen and certain foods, *desensitization*.

Desensitization to food is indicated if the offender cannot conveniently be avoided permanently. The simplest and best method is to give very small but increasing amounts three or four times daily. In the event of a fresh outbreak of urticaria, treatment is still continued but the dose is not increased again until the eruption disappears.

Sulphonamides.—Intestinal antiseptics of the sulphonamide group offer new therapeutic possibilities in urticaria due to products of bacterial putrefaction in the intestine, which I believe is not uncommon. The diagnosis is suggested by a history of constipation and the presence of indican in the urine. I have given sulphaguanidine in doses of 3.5 gm., four times daily, and the urine has become indican-free in a week or less, after which there seems to be no point in continuing the drug. Results have been good, but assessment of the treatment is not yet possible: cures may even have been due to the psychological effect of a new drug.

If the eruption is produced by emotion, *inhibition of the cholinergic nerves* by atropine or belladonna is rational and, in some cases at any rate, gives considerable relief.

NON-SPECIFIC TREATMENT.—Many treatments have been advocated for those cases, unfortunately rather numerous, in which the exciting agent cannot be removed or is not discovered. None is universally successful and sometimes the urticaria persists in spite of all.

(a) *Desensitization* treatment: autogenous urinary "proteose" (Barber and Oriel, 1928); autohæmotherapy; peptone; injections of sterile milk, T.A.B. vaccine, sulphur, thiosulphates.

(b) Treatment aiming at *removal of H-substance*: histaminase (torantil); lertigon (hapamine).

(c) Other treatments:—adrenaline; ephedrine; calcium; nicotinic acid; vitamin K.

I have had most success with "proteose", autohæmotherapy, and peptone. Peptone may be given by mouth, in doses of 1 gm. half an hour before meals, or by intravenous or intramuscular injection of a 5 per cent. solution (Armour's no. 2), every four or five days, starting with 0.1 c.cm.

Most observers agree that histaminase is valueless. Lertigon, given by injection, is a combination of histamine with a protein, the object being to produce antibody to combine with H-substance and so prevent its action: I have no first-hand knowledge of its therapeutic value.

I am not convinced that adrenaline does any good, even in an acute attack, or that ephedrine diminishes the frequency or severity of attacks. Calcium

TREATMENT

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THE TREATMENT OF SEBORRHŒIC DERMATITIS

By R. M. BOLAM, M.D.

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DURING the last few years there has been a considerable increase in the number of people suffering from seborrhœic dermatitis, and this complaint is now appearing in a number of varied forms and in conjunction with other skin diseases. It is becoming commonplace to find a moderate to considerable degree of seborrhœa of the scalp in men and women patients, and the presence of retro-auricular fissures with localized inflammation can often be demonstrated.

Many of the beds in skin wards are occupied by severe and intractable cases of seborrhœic dermatitis which exercise the ingenuity of physician, nurse and orderly to the full. This was always so, but figures can be produced to show that the incidence of the disease is on the increase.

There is a modern tendency to find some mental disturbance as a contributory factor in the causation of skin disorders and the seborrhœic subject is no exception to this trend. Lastly, and perhaps most important of all, faulty diet is blamed for the occurrence of so many seborrhœic disorders. The stress and strain of six years of war, coupled with a changed diet, have brought many a patient who had slight signs of the seborrhœic diathesis into the hands of the dermatologist for treatment of a more generalized eruption.

TYPES OF ERUPTION INCLUDED UNDER THE HEADING OF SEBORRHŒIC DERMATITIS

- 1) Acute spreading *lesions* of erythematous type *on the face and neck*, associated with a pronounced degree of seborrhœa of the scalp.

The patient becomes alarmed because red blotches have appeared on the neck below the ears and are spreading forward on to the face. No particular note has been taken of any excess of dandruff and this may not be obvious on clinical examination, as the hair has probably been washed recently. Early treatment will check the eruption in most cases and might consist of:—(a) More frequent shampooing of the scalp with liquid soap shampoo; (b) gentle application of 1 per cent. tar, calamine and zinc oxide in an emulsion base.

- (2) Extensive acute spread of *small oval or circular erythematous-squamous patches* of dermatitis *on trunk and limbs*.

There is sometimes great difficulty in distinguishing this eruption from pityriasis rosea, but the location of lesions on the legs, forearms, face and neck, and the absence of glandular enlargement, should help to decide in favour of seborrhœic dermatitis. A number of these patients will exhibit

seems to help in many cases, but it is impossible to dogmatize concerning the relative values of its many different preparations. It is at any rate harmless, and can be given with other treatment. Nicotinic acid, in doses of 20 mgm. twice daily, and calcium lactate, 5 grains three times daily with meals, is reported to have produced dramatic cures (Chambers and Bernton, 1944). Vitamin K, the latest treatment, given in the form of menaphthone, 2 mgm. thrice daily before meals, is advocated on the grounds that the prothrombin content of the blood is diminished in many cases of chronic urticaria (Black, 1945), but the therapeutic claims await confirmation.

PAPULAR URTICARIA (LICHEN URTICATUS)

This common disease of childhood is characterized by small weals which, subsiding in the course of a few hours, leave hard itchy papules, papulovesicles or occasionally small bullæ. It is not, as is often averred, ordinary urticaria modified by some peculiarity of a child's skin, but a separate condition with a different etiology (Tate, 1935). It has been conclusively demonstrated that the exciting agent is not food but something in the child's home environment; its nature, however, remains obscure. (Hallam, 1927, 1932; Tate, 1935). Heat, and a diet containing too much carbohydrate, aggravate the condition; teething, digestive disorders and mild febrile illnesses are probably predisposing factors of minor importance. Treatment therefore consists in avoidance of overclothing, adequate ventilation of the bedroom, restriction of the carbohydrate intake, correction of any digestive disorder, and anti-pruritic applications, e.g., 3 per cent. solution of coal tar in calamine lotion or 1 per cent. menthol cream. I am convinced that a soda and rhubarb mixture is often helpful, but it is by no means an infallible cure. Fortunately, most patients recover spontaneously in later childhood.

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reatment is advised. The axiom "self treatment is bad treatment" is particularly applicable to this type of case. The popular idea that medicaments should be rubbed well into the skin will only result in a disastrous spread of the disease.

(1) *Rest*, mental and physical, is essential to check the disease process. Complete rest in bed should be insisted upon but the bedclothes should be as light as possible in the circumstances. Freedom from business and family worries will expedite recovery.

(2) *Efficient nursing* care should be obtained, and if the patient is admitted to hospital it should be the aim of the dermatologist in conjunction with the matron to provide someone who is interested and skilled in the treatment of patients with all types of skin disease.

(3) Regular visits should be paid to the patient with an acute infected seborrhœic dermatitis. It is only by doing this that success can be obtained in as short a time as possible. The clinical picture may change rapidly and necessitate an immediate alteration in treatment.

(4) The patient will need the utmost encouragement, but it does not do to be too optimistic as it is quite common for a temporary relapse to take place, and enthusiastic statements of prognosis should be avoided in his above all other skin disorders.

DIET.—It is generally agreed that the seborrhœic patient should curtail the intake of carbohydrates, starches and fried foods, and increase the amount of protein, fruit and fresh vegetables with some, at least, of the latter taken in a raw state.

Supplements to diet: (a) Fat-soluble vitamins A and D in the form of cod-liver oil, halibut-liver oil or adexolin; (b) vitamin C in the form of ascorbic acid, 150 mgm. daily; (c) vitamin B complex is present in brewers' yeast, bakers' yeast and bemax, which are recommended in this condition.

INTERNAL MEDICATION

(a) *Sedatives*.—These must be taken in full dosage to relieve irritation and give rest to the patient.

(i) Potassium bromide and chloral, āā 20 grains, or luminal, 1 grain each night.

(ii) Luminal, $\frac{1}{2}$ grain b.d., or a mixture containing sodium bromide, 10 grains, potassium bromide, 10 grains, tincture of nux vomica, 5 minims t.d.s.

(b) *Alkalis*.—A powder such as the following may be taken for several weeks:—

℞ Bicarbonate of soda	
Calcium carbonate	
Heavy magnesium carbonate	āā 1 ounce
Bismuth oxycarbonate	120 grains
1 teaspoonful t.d.s. after meals	

A mixture containing bicarbonate of soda, magnesium carbonate and potassium citrate is sometimes preferable.

an early anxiety state and a careful case history may elicit reasons for this important contributory factor in the spread of the disease.

Treatment should be on general lines, and must include rest and the prescribing of sedatives. A few days off work and restful sleep at night will do much to help recovery and prevent further spread, with possible change from a dry eruption to an exudative phase. A strict limit should be placed on the number of baths, and the popular idea of a daily bath with the use of antiseptics in the water must be discouraged. Exercise should also be limited. Local application of a simple lotion such as:—

R Strong solution of lead subacetate
 Solution of hamamelis.....â€” 120 minims
 Calamine lotionto 6 ounces

These measures, and the wearing of cotton or silk next to the skin, should give relief and can be followed after a suitable interval by some less drying preparation, such as 4 grains of ichthyol in zinc cream, 1 ounce to be smeared lightly on all affected parts.

(3) The acute spreading *infective seborrhœic dermatitis, involving scalp, ears, axillæ and groin* in particular, is one of the most difficult skin conditions to treat successfully. This usually supervenes on a severe seborrhœa capitis with retro-auricular fissuring and an erythematous-squamous rash in the axillæ, on the chest and in the pubic region.

A red and sealy, itching scalp suddenly begins to weep and is soon covered with yellow crusts on an angry scarlet background. The retro-auricular spaces are acutely inflamed, with much septic discharge. The skin of the pinna and adjacent part of the cheek and neck show lesions of the impetigo type. The skin in the axillæ is red and may be exuding serum. The scrotum is often œdematous, with the contiguous skin on the thighs showing a diffuse erythema with exudation, and some discrete pustular elements may be spreading out from this region. An intertrigo in the groin and beneath the breasts is often present. Elsewhere, on the chest, back, arms and legs a diffuse erythematous eruption completes the picture and it is not surprising that the facial appearance of such a patient will show signs of depression and insomnia.

INVESTIGATION

A careful history should be taken and search made for any factor which has contributed materially to the onset of the acute infective spread. Special attention should be paid to:—(a) The psychological background; (b) the presence of any disease in the nose, accessory sinuses or middle ear; (c) diet; (d) the use of unsuitable methods in the application of treatment which has already been tried; (e) the use of unsuitable preparations as a precipitating factor in the present outbreak; (f) culture of the organisms from infected sites.

TREATMENT

Specific instructions must be given to the patient and relatives if home

reatment is advised. The axiom "self treatment is bad treatment" is particularly applicable to this type of case. The popular idea that medicaments should be rubbed well into the skin will only result in a disastrous spread of the disease.

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(c) *Iron and arsenic*.—Many of the chronic cases of seborrhœic dermatitis show definite hypochromic anæmia on investigation and the taking of full doses of iron and ammonium citrate, 30 grains t.d.s., with arsenical solution, 5 minims, in a mixture, is indicated, and must be continued for several weeks to bring about the desired improvement.

(d) *Sulphonamides* are not contraindicated when there is marked secondary infection and sulphathiazole, 1 gm. four-hourly, with a total dose of 25 gm., may cause dramatic improvement when given in a suitable case. The usual precautions should be observed of inquiring into previous sensitivity, giving a diuretic mixture, and prescribing adequate quantities of free fluids.

(e) *Penicillin* may also be justifiable in the heavily infected cases, and may be given intramuscularly if culture has shown that the predominant organisms present are sensitive to this drug. The total dose is an arbitrary figure which must be dependent upon the improvement shown in each individual.

LOCAL TREATMENT

Baths.—(a) Bran: a muslin bag containing 3 lb. of bran is tied firmly at the neck and held beneath the tap while the hot water is run; 25 gallons of water at a temperature of 98°F. constitutes the bath. (b) Alkaline: sodium carbonate or potassium carbonate, 2 ounces, is added to the bath.

The scalp.—In the acutely inflamed state a saline compress or starch poultice is often the only remedy that the scalp will tolerate. Without going into the making of a starch poultice it may be noted that this excellent remedy is at times badly made and wrongly applied. How often is the starch seen adhering in a dried-up cake to the scalp and hair when it should be separated from the skin surface by a layer of gauze and backed by a piece of linen or white lint with edges neatly tucked in. Liquid penicillin (250 units per c.c.) may be sprayed on to the scalp with definite success in some cases, or penicillin cream of 500 units per gm. may be used; these remedies have their use in treating impetigo lesions on the face and ears. Acute inflammation is always followed by desquamation and subsidence of the bright erythema on the scalp, and when this stage is reached it is time to change the treatment to one which will reduce scaling but not stimulate too much. A weak mercury sulphur and salicylic pomade with oily base should be applied gently to counteract the dryness and scaling, and after a time careful shampooing with liquid soap may be included in the scalp toilet.

The ears.—These always present an awkward problem in treatment. One of the reasons is the uneven contour of the ear with its curved surfaces, and the difficulty of applying medicaments. Septic material collects in the deep fissure behind the ear, and adverse conditions of heat and movement prevail when the head comes in contact with the pillow in bed. Preliminary cleansing to remove crusts or discharge should be carried out,

and may be followed by the application of penicillin spray or cream, as used for the scalp, if bacteriological examination indicates that this form of treatment may be successful. More often, however, soaks have to be relied upon and a solution of 1 per cent. silver nitrate is a useful remedy, or Burow's solution may lessen the secretion and dry the skin over the back of the ear and adjacent scalp. Following this, a 1 per cent. ichthyol paste is applied and the part is cleaned gently with liquid paraffin as necessary.

The groin.—Rest in bed is needed to relieve œdema of the scrotum, and calamine cream is a comfortable first dressing. Fissan dusting powder (plain) has proved of value in the past in the treatment of intertrigo in this and other parts of the body.

The body and limbs.—In the acute phase with exudation the simplest of remedies should be employed, and a saline soak is recommended. After two days of dressings repeated four-hourly, soaks may be replaced by zinc oxide and starch in a water-miscible base. Preparations containing sulphur and tar are best reserved for the later stage of quiescence and recovery, and even then should be used in low percentage strength, or a flare-up may ensue. A weak ichthyol and zinc cream applied twice daily to the body and limbs is often effective.

By this regime the patient with severe, acute infected seborrhæic dermatitis will gradually return to normal and the time will arrive when a change of surroundings becomes necessary. The unstable psychological background of these patients has already been mentioned, and if recovery is delayed it may be that the patient is worrying about affairs at home. A stage may be reached beyond which it is unwise to keep the patient in hospital, and if dressings are not too extensive a return to home surroundings, with daily attention from a skilled nurse or male orderly, will be in the best interests of the patient and, to a certain extent at least, will prevent further worry and depression. Many of these patients are highly conscientious and will try to return to work before they have made a complete recovery. A period of convalescence and rehabilitation should be insisted upon and some real attempt made to decide if the artisan is suited to the work he or she was doing before the acute outbreak.

CONCLUSION

An attempt has been made to give a word picture of three definite types of eruption which are comparatively common to-day. It is not claimed that this presents an exhaustive study of seborrhæic dermatitis in all its phases, for these are too numerous and diverse to be included in this article. No mention has been made of flexural eczema of chronic type or of exfoliative dermatitis, both of which may be associated with seborrhæic dermatitis. The use of ancillary methods of treatment, such as ultra-violet light and superficial X-rays, is best left for the decision of the dermatologist in each particular case.

(e) *Iron and arsenic*.—Many of the chronic cases of seborrhæic dermatitis show definite hypochromic anæmia on investigation and the taking of full doses of iron and ammonium citrate, 30 grains t.d.s., with arsenical solution, 5 minims, in a mixture, is indicated, and must be continued for several weeks to bring about the desired improvement.

(d) *Sulphonamides* are not contraindicated when there is marked secondary infection and sulphathiazole, 1 gm. four-hourly, with a total dose of 25 gm., may cause dramatic improvement when given in a suitable case. The usual precautions should be observed of inquiring into previous sensitivity, giving a diuretic mixture, and prescribing adequate quantities of free fluids.

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OINTMENT BASES

By W. N. GOLDSMITH, M.D., F.R.C.P.

Physician in charge, Skin Department, University College Hospital.

THE suggestions in this article are conditioned by the post-war situation, and it is therefore necessary briefly to review the more important materials.

MATERIALS AVAILABLE

Animal fats.—These have the virtue of being readily "absorbed" below), and are said to be metabolized subsequently (Berry, 1945) but are liable to rancidity which makes them irritating and offensive. for this reason they have been discarded. Lard alone survived was found long ago that it could absorb out from Siam benzoin, an oxidant which retards rancidity. To-day, however, the new anti ethyl and propyl gallate, which are neutral and innocuous, are Benzoinated lard may therefore become obsolete, its disadvantages that it can irritate, is liable to react with and inactivate many and is unpleasantly greasy. In any event supplies are much restricted.

Wool fat is readily obtainable. It is really a wax and can absorb water aqueous solutions to produce water in oil (w/O) emulsions. Although sticky to use by itself, it makes emollient creams when mixed with oil or paraffin. It is readily "absorbed". If purified it does not go

The paraffins.—Soft paraffin is in good supply. Liquid paraffin is for all medical purposes. The paraffins are bland, neutral, non-reactive, cannot go rancid, but they are poorly "absorbed" and cannot be

Non-mineral oils.—The most useful vegetable oil available is arachis, supplies of which are restricted. Cod-liver oil is also available and seems have certain therapeutic advantages, allaying inflammation and healing. These have been ascribed to its content of vitamin A, vitamin and the lipoids. The presence of a relatively large amount of fatty acids is also thought to confer healing virtues upon cod-liver linseed oil, and maize oil. Cod-liver oil, however, has an unpleasant which is difficult to mask; linseed oil is drying. Castor oil is valuable its viscid and clinging, and therefore protective, properties. As in the of animal fats, an anti-oxidant should be added to prevent rancidity.

Powders.—Kaolin and zinc oxide are plentiful, and purified talc available. Starch is restricted and, although it is useful for absorb moisture, it is not employed so much as formerly, owing to its liability fermentation.

Jellies.—Glycerin of starch is useful when grease is contraindicated. It said to be readily "absorbed". Glycogelatin can be used for prolonged greasy contact, e.g., in Unna's paste. Jellies are made by mixing gl with tragacanth or gelatin. During the war, owing to the shortage of gly. substitutes for these mixtures were widely used, e.g., the methyl c.

alcohols with about 10 per cent. of their sulphated products. It is a rather variable preparation, sometimes containing phosphated instead of sulphated esters. o/W emulsions have a more soapy feeling than w/O. A generally useful formula for an o/W emulsified base is:—

Lanette wax SX	10
Arachis oil	20
Yellow soft paraffin	20
Water	50

The proprietary HEB (Halden's emulsifying base), introduced by Mumford (1938), consists of liquid paraffin 3, soft white paraffin 2, lanette wax SX 2, and contains no water. I shall refer to a base of this type as "water-miscible base". There is, as yet, no water-miscible base in the B.P.

o/W emulsions, even if made with paraffin, when rubbed into the skin largely "vanish", leaving the surface free from greasiness. They form valuable protectives in dirty jobs, for by filling the follicles beforehand with emulsifiable material they enable the dirt to be easily washed out, thus avoiding the necessity for harmful, strong detergents or vigorous scrubbing. Moreover, rubbed in beforehand they do not interfere with even delicate work, as they do not soil paper or fabrics. On the other hand o/W emulsions have the disadvantage that if produced in bulk and stored they are apt to dry up, and they easily grow moulds unless a preservative is added, e.g. chlorocresol 1 in 1000. They are particularly suitable for administering alkaloidal salts, germicides, and other water-soluble medicaments, e.g. lead subacetate, aluminium acetate, and resorcin. Phenol, too, would be more active in such a base than in any other ointment base, especially on an oily skin, as phenol has more affinity for oil than for water.

o/W emulsions are valuable vehicles for applying penicillin. The formula found most satisfactory at University College Hospital is:—

Lanette wax SX	12.5
Cetyl alcohol	9.375
Liquid paraffin	78.125
Water	50

To this the penicillin solution is added up to 200. Chlorocresol is used as a preservative (0.1 per cent. of final product).

o/W emulsions are cooling from evaporation, and for general pharmaceutical and dermatological formulation are superior to w/O bases, especially in their slighter interference with heat radiation and with bactericidal action, and their greater miscibility with serum. I have found them to be well tolerated, although Burrows and Russell (1945) report sensitiveness of some patients' skins to lanette wax SX (I have more often found Hydrous Ointment irritating).

All emulsified or emulsifying bases are easier to wash off than other ointments, but this applies to a much greater degree to o/W emulsions. Both types, moreover, facilitate the mixing of the skin secretions, whether watery or oily, with the constituents of the base. Consequently, the action of contained medicaments is likely to be heightened, and they should therefore

prescribed in smaller percentages. For instance, in the B.P. Addendum 7, mercurated mercury ointment contains $2\frac{1}{2}$ per cent. of the active substance Simple Ointment, whereas hydrous ammoniated mercury ointment contains only 1 per cent. in Hydrous Ointment. Both water-soluble and fat-soluble medicaments can generally be incorporated satisfactorily in either V or w/O emulsions, but as a rule they act more efficiently if the vehicle in which they are soluble forms the continuous phase. Acriflavine is incompatible with lanette wax SX.

ABSORPTION AND PENETRATION

Coming to ambiguous writing, there is much confusion on this subject. It is necessary to distinguish absorption into the blood stream from mere penetration into the skin; and, again, to distinguish absorption or penetration of the constituents of the base itself, from absorption or penetration of incorporated active medicaments. It would be advantageous, as Harry (1944) suggests, if the term "absorption" were restricted to the passage of substances into the blood stream, and "penetration" used for the entering of substances into the skin. Constituents of the bases themselves are not known to be absorbed into the blood stream. With regard to penetration, nothing has been demonstrated beyond running down into the hair follicles and sebaceous glands. In this sense the following penetrate particularly well:—oleic acid, cod-liver oil, lanolin and oleyl alcohol; and slightly less well:—cottonseed oil, avocado pear oil, castor oil and olive oil. Their penetration is enhanced by the addition of an essential oil, e.g. oil of eucalyptus. There is no evidence that avocado pear or turtle oils have any special advantages.

Paraffins and other non-polar compounds do not penetrate at all unless emulsified.

Emulsifying agents can bring about the penetration of any constituent of an ointment, including the paraffins. (It has been questioned whether carrying paraffin into the follicles may not be undesirable, in that, as opposed to vegetable and animal fats, it is not further metabolized; but it is doubtful to what degree even the latter are metabolized from that situation). Harry (1944) has shown that in neither o/W nor w/O creams does the aqueous phase penetrate to any appreciable extent. If two emulsions are prepared, one w/O and the other o/W, using an emulsifier of similar constitution, with identical proportions of oil and water, and if they are homogenized to give the same dispersion size, there is little difference in penetration properties as far as physical oiliness.

With regard to incorporated medicaments, absorption into the blood stream is mostly a function of the drug itself rather than of the vehicle. Mercurials, vitamin D, salicylates, iodine and some hormones, e.g. œstrin, are easily absorbed through inunction.

CLINICAL INDICATIONS

The choice of base depends upon weighing up a number of often conflicting considerations. The bearing of incorporated medicaments has been indi-

cated in the above sections. The problem must now be approached more from the angle of the skin itself.

TYPE OF SKIN.—For *dry* states of the skin a simple fatty base should be chosen. For mere emollient effect, many victims of xeroderma find plain soft paraffin most effective and agreeable, especially when rubbed in after a hot bath while the skin is still moist. For applying to the hands after washing, to prevent chapping, the following cream is satisfactory, and does not leave the surface of the skin greasy:—

Powdered tragacanth	1
Industrial methylated spirit	7
Glycerin	14
Arachis oil	3.5
Tincture of benzoin	2
Water	100

For *greasy* skin an appropriate medium would be a cream containing simply lanette wax SX, 3 per cent. in water. When this is rubbed gently on the skin it forms a soapy lather with the oily skin secretion, which it thereby removes.

For *intermediate* types of skin, a particularly useful base for general purposes is the anhydrous water-miscible cream. There is no advantage in adding water, except for its temporary cooling effect or for the purpose of incorporating solutions, such as solution of aluminium acetate, or liquid extract of hamamelis.

For *streaky* skin, water-miscible cream is also suitable, or the anhydrous ointment of wool alcohols.

SIZE OF AFFECTED AREA.—For large areas it is more comfortable and economical to use a soft, easily spreadable ointment or cream, which can be achieved by incorporating enough liquid oil, e.g. arachis oil 20, hydrous wool fat 20, yellow soft paraffin 60. Water-miscible cream (IEB type) also spreads well, as it contains a large proportion of liquid paraffin. For small lesions, on the other hand, it is better to use a stiffer application, which stays where it is put. If they are moist, a zinc paste is most appropriate:—

Kaolin	18
Zinc oxide	25
Liquid paraffin	7
Hydrous wool fat	25
Yellow soft paraffin	25

Simple Ointment B.P. suits dry patches.

REGION OF THE BODY.—For *flexures*, especially where there is much movement, e.g., the groins, it is essential to use a base with lubricating properties. The o/W emulsions are here pre-eminent, whereas ointments containing lanolin or its derivatives should be avoided.

The scalp.—For treating the surface of a dry scalp, women with long hair mostly prefer a liquid application, such as wool fat 6, arachis oil and lime water (equal parts) up to 100. For a man's scalp an o/W cream is by far the most pleasant base. It is also recommended for treating follicular infections

here or elsewhere, an alternative being eucalyptus oil 6, arachis oil 30, wool fat 28, soft paraffin 36.

The eyelids.—I wish particularly to warn against the use of *white* soft paraffin, which can be intensely irritating owing to the presence of traces of bleaching agents. Simple Eye Ointment B.P.C. is satisfactory, although often a more cooling ointment, such as an o/W cream, is more soothing.

The legs, affected, for instance, with chronic dermatitis, often will not tolerate any kind of grease, and do better with a jelly or glycerin base, such as equal parts of zinc oxide, talc, glycerin and water.

OPEN OR RAW SURFACES.—Here, too, an o/W cream is indicated, or a mucilaginous preparation, as recommended by Durham and Rae (1945) for burns: sodium alginate 10 per cent., liquid paraffin 10 per cent., with a preservative. In treating *acute weeping eczema*, o/W emulsions are useful to alternate with watery lotions or paint. When dry secretion or calamine has formed hard cakes on the skin, a water-miscible cream applied for a few hours will soften these crusts, which can then be easily bathed off with a watery lotion.

PROTECTIVES.—For protecting against water or watery discharges, Hydrous Ointment can be used, or zinc and castor oil ointment, which has long been popular, especially for protecting babies' skin against urine. In making this it must be remembered that castor oil does not mix with the new zinc oxide ointment. At University College Hospital we find the following formula satisfactory:—

Zinc oxide	10
Castor oil	53.3
Wool alcohols	3.2
Oleic acid	1
Stearic acid	1.25
Lime water	to 100

For protecting the surrounding skin against pus from boils and infective areas, a stiffer barrier, such as Simple Ointment, is desirable.

Many and various "barrier creams" have been devised by commercial firms for protecting the skin against the numberless hazards met with in industry, but with only partial success. Against drastic industrial degreasers the following can be tried: wool fat, arachis oil, equal parts.

Preparations against sunlight, containing for instance quinine, 2 to 3 per cent., should for cosmetic reasons be of the vanishing type, e.g., an o/W emulsion, or stearic acid paste, B.P.C.

I am indebted to Mr. H. Davis, B.Sc., Ph.D., Chief Pharmacist, University College Hospital, for helpful criticisms and suggestions.

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RADIO-ACTIVE SUBSTANCES IN THE TREATMENT OF DISEASES OF THE SKIN

By ARTHUR BURROWS, M.D., F.R.C.P., D.M.R.E.

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THE treatment of diseases of the skin by radio-active substances at the present time means, in practical terms, skin therapy by radium, radon and thorium X. It can also be expressed in another way, i.e., as gamma ray treatment by radium and radon, and alpha and beta treatment by radon and thorium X. In earlier times treatment was carried out by simple techniques, using radium plates on the skin and X-rays at 60 to 100 kv unscreened or with screens of $\frac{1}{2}$ mm. of aluminium, and the dosage was often expressed in "Saboraud's pastilles". The use of thorium X is a much later development.

In those earlier days it could quite rightly be said that radium was superior to X-rays in the treatment of malignant disease of the skin; now the question demands a much more complex answer, but even at the start there were few *non-malignant* skin conditions in dealing with which radium was preferable to X-rays. In fact, in these diseases X-ray therapy held its ground from the first.

Owing to the fact that X-ray beams were always mixed, it was maintained that in skin treatment many rays passed through the skin and too few stopped in the requisite tissues. In consequence, Grenz rays or borderline rays, working at $10 \pm$ kv, when first used were thought to be likely rivals of, or even superior to, X-rays in skin therapy. Taken as a whole this idea has not proved true, and although Grenz rays have a definite value they are of much less all-round use than X-rays for all types of non-malignant skin diseases, and for malignant conditions they are rarely used.

Radium plates in the treatment of skin disease have been largely, but not entirely, replaced by the use of radium and radon tubes, needles and seeds in superficial and implantation techniques. The more recent, though pre-war, progress in superficial gamma, beta and alpha ray applications came through the employment of wax plates of radio-active deposit from radon, and alcoholic and liquid varnish vehicles containing thorium X, of which more is written later.

In an intermediate period Chaoul contact, or close X-ray therapy, was thought to provide a definite X-ray technique which would replace radium in the treatment of malignant disease of the skin, but it, too, useful as it is, has not maintained its high status, for various biological and mechanical reasons.

The latest X-ray technique for the treatment of malignant disease of the skin is one closely allied to that given by Professor Windeyer in 1943, i.e., at 95 kv, 4 ma, screen Al. $\frac{1}{2}$ to 1 mm.—distance 8 cm. upwards; 2,600 to 3,000 "r" units are given, usually, but not always, fractionated (520 "r" units on consecutive days up to the stated total). It is not out of place to draw attention here to the use of the modern ionization or "r" unit, now universally applied in X-ray therapy. This technique has given excellent results and has certainly challenged radium therapy in the field of skin malignancy, but, in my opinion, it is not quite so successful as radium therapy, and the cases in which it is used should be carefully selected.

THE USE OF RADIUM

Radium itself can be used as follows:—

(1) *Superficial distance technique* in which the radium in tubes is maintained at a definite, even distance from the skin surface. Placing the radium or radon at some distance from the surface gives a relatively better dose deep in the tissues than that which is obtained by putting the active source close against the skin or ulcer.

(2) *Implantation or burying techniques.* These are usually carried out by:—

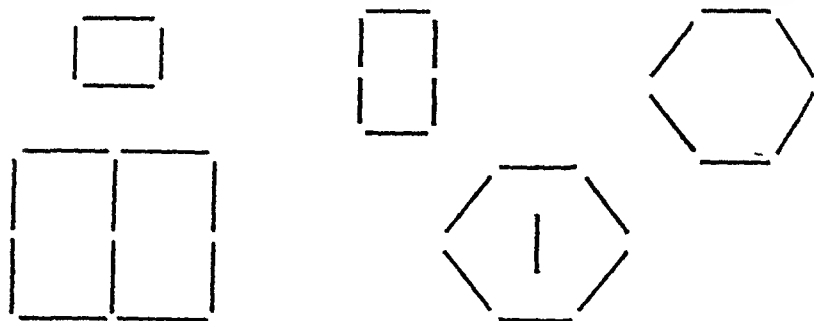
(a) Radium needles of standard strength, screened by 0.3 to 0.5 mm. or more of platinum.

(b) Radon needles or seeds. Radon needles may be used like radium tubes or, alternatively, the very small Muir or other seeds are available. These last are most often employed of an initial strength of 1.5 millicuries (mc.) to the linear centimetre. The length is usually, but not always, 0.5 to 1 cm. and the screen is of platinum (0.3 to 0.5 mm.). An initial dose of radon of 1.5 mc. in the course of five days gives an average of about 1 mc. per day. It should be noted that the Medical Research Council Radon Laboratories lists Muir seeds as 5, 7, 10, and 17 mm. long.

The methods of application of radium and radon tube needles and seeds and their dosage are complex matters which cannot be dealt with in full in part of an article of this length. Those who would learn in detail should study Ralston Paterson's article (part 1) on "A dosage system for gamma ray therapy" (1934), in which the evaluation of the "r" unit in radium therapy is discussed and 8.4 "r" per hour is accepted as the intensity of radiation at a distance of 1 cm. from a 1 mgm. point source of radium filtered by 0.5 mm. of platinum. The dose given to tumours is most often 5,000 to 6,000 "r" units.

When applying radium or radon at a distance from the surface, circles are the most useful form to make up with tubes, and it is then most successful if the diameter of the circle is 2.83 times the distance of the radium from the skin. If the distance is increased to say 5 to 6 times the diameter, radium or radon must be placed in the centre of the circle. The use of circles is not

always possible or correct, and then other regular shapes may be formed. Thus, in circles and other forms arrangements such as these are produced:—



These are shown and described in Paterson's article in much more detail, and tables and graphs are given for calculation of dosage. The same arrangements of radium and radon needles and seeds can be used for single plane implantation, such as is usually suitable for adoption in skin work. For this purpose the distance is assumed to be 0.5 cm. and the dosage is calculated in the usual manner. The article does not call for an advanced knowledge of mathematics and can be read, understood and acted upon by any dermatologist.

MALIGNANT TUMOURS

The results attained by the above-mentioned methods in the treatment of rodent ulcers and squamous-celled carcinomas are the best so far obtainable in these conditions. It is, however, perhaps best to sound a note of warning on the treatment of malignant disease of the skin, because it so often happens that a doctor obtains his own best personal results, not by the best possible method of treatment, but by the practice with which he is most familiar. A surgeon is better advised to excise a tumour than to use a form of treatment with which he is not thoroughly familiar, even though taken as a whole radio-therapeutic results in the treatment of malignant disease of the skin are, in the majority of cases, preferable to purely surgical methods.

It is assumed that the treatment of secondary glands is outside the province of the dermatologist, but in the majority of cases of squamous-celled carcinoma of the skin they need not be feared, although a continuous observation of all patients who have suffered from squamous-celled carcinoma of the skin should be maintained.

I prefer the excision of melanomas of the skin to any other form of treatment and, in spite of some radiologists' experience, am not impressed with the results of radium or X-ray treatment of these tumours.

BENIGN TUMOURS

Certain benign tumours of the skin respond well to treatment by radium, especially warts, papillomas, angiomas, and keloids and vicious scars. In a

large proportion of these conditions the treatment may be carried out by radium plates.

WARTS.—Of the many methods for the treatment of warts, with the possible exception of properly carried out curettage, radium is the best. Radium plates can be used unscreened and of a strength of 5 mgm. of radium to the square cm. Modern radium plates are covered by thin layers of monel metal and not by varnish. In these circumstances exposures of from 50 to 75 minutes are given. The reaction starts in about a week, and persists for several weeks, after which, in most instances, the wart disappears. As with X-rays, this method of treatment has one advantage, i.e., if the wart is destroyed by radio-therapeutic methods, not infrequently the other warts disappear spontaneously. It may be necessary to destroy two or three warts before this development takes place. Plantar warts may be treated in exactly the same way, but it is well not to repeat the treatment more than once on the sole of the foot, as otherwise permanent tenderness may result.

There are practically no cases in which the burying of radon 'seeds' in warts is justifiable, nor are distance or screen techniques necessary.

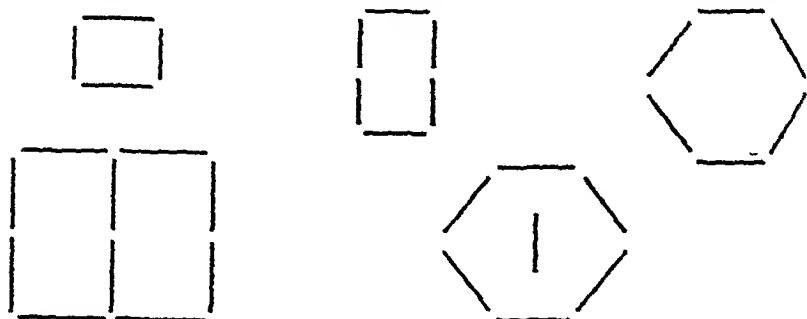
ANGIOMAS—(a) In a few instances small *capillary angiomas* are well treated by short doses of radium given on the surface, but, on the whole, other methods are desirable.

(b) *Cavernous nævi*.—These may be treated by screened or even unscreened radium applied on the surface. Thus an exposure of a radium plate of 5 mgm. to the square centimetre for fifteen to thirty minutes is often given. The application may be increased up to one hour or more. A screen of 0.5 to 1 millimetre of aluminium is used with advantage. But the most striking results in the treatment of cavernous nævi, especially those which are hopeless looking growths, is obtained by employing buried radon seeds.

Large numbers are not needed: about one to every two to three centimetres or square centimetres will suffice. Bleeding is never troublesome. Also, it is not necessary to give the carcinoma dose. The condition is a benign one and treatment can be repeated at a later date with a great chance of further improvement. Exposures of twenty-four hours are therefore enough; certainly not more than forty-eight hours should be risked. Improvement, in the form of blanching and shrinking, is usually seen in five to six weeks. Treatment may be repeated in three months and cosmetic results are much better than would be obtained if big carcinoma doses were administered. In fact, no other treatment gives such good cosmetic results in large cavernous nævi.

KELOIDS AND VICIOUS SCARS.—Treatment of these conditions from the surface with X-rays is most commonly advocated. Superficial radium plates screened by 1 mm. of lead may be employed with exposure up to six to fifteen hours. On the other hand, the most difficult cases which

always possible or correct, and then other regular shapes may be formed. Thus, in circles and other forms arrangements such as these are produced:—



These are shown and described in Paterson's article in much more detail, and tables and graphs are given for calculation of dosage. The same arrangements of radium and radon needles and seeds can be used for single plane implantation, such as is usually suitable for adoption in skin work. For this purpose the distance is assumed to be 0.5 cm. and the dosage is calculated in the usual manner. The article does not call for an advanced knowledge of mathematics and can be read, understood and acted upon by any dermatologist.

MALIGNANT TUMOURS

The results attained by the above-mentioned methods in the treatment of rodent ulcers and squamous-celled carcinomas are the best so far obtainable in these conditions. It is, however, perhaps best to sound a note of warning on the treatment of malignant disease of the skin, because it so often happens that a doctor obtains his own best personal results, not by the best possible method of treatment, but by the practice with which he is most familiar. A surgeon is better advised to excise a tumour than to use a form of treatment with which he is not thoroughly familiar, even though taken as a whole radio-therapeutic results in the treatment of malignant disease of the skin are, in the majority of cases, preferable to purely surgical methods.

It is assumed that the treatment of secondary glands is outside the province of the dermatologist, but in the majority of cases of squamous-celled carcinoma of the skin they need not be feared, although a continuous observation of all patients who have suffered from squamous-celled carcinoma of the skin should be maintained.

I prefer the excision of melanomas of the skin to any other form of treatment and, in spite of some radiologists' experience, am not impressed with the results of radium or X-ray treatment of these tumours.

BENIGN TUMOURS

Certain benign tumours of the skin respond well to treatment by radium, especially warts, papillomas, angiomas, and keloids and vicious scars. In a

large proportion of these conditions the treatment may be carried out by radium plates.

WARTS.—Of the many methods for the treatment of warts, with the possible exception of properly carried out curettage, radium is the best. Radium plates can be used unscreened and of a strength of 5 mgm. of radium to the square cm. Modern radium plates are covered by thin layers of monel metal and not by varnish. In these circumstances exposures of from 50 to 75 minutes are given. The reaction starts in about a week, and persists for several weeks, after which, in most instances, the wart disappears. As with X-rays, this method of treatment has one advantage, i.e., if the wart is destroyed by radio-therapeutic methods, not infrequently the other warts disappear spontaneously. It may be necessary to destroy two or three warts before this development takes place. Plantar warts may be treated in exactly the same way, but it is well not to repeat the treatment more than once on the sole of the foot, as otherwise permanent tenderness may result.

There are practically no cases in which the burying of radon seeds in warts is justifiable, nor are distance or screen techniques necessary.

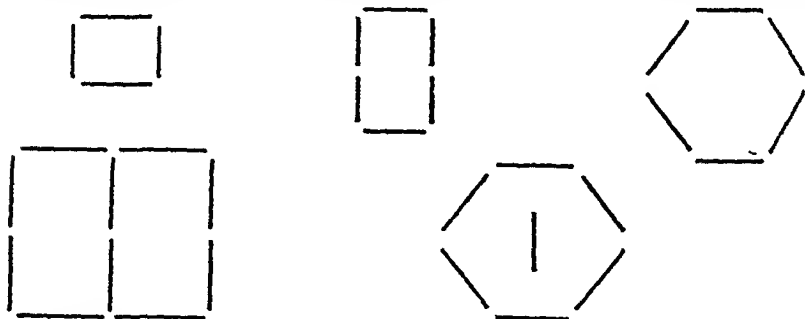
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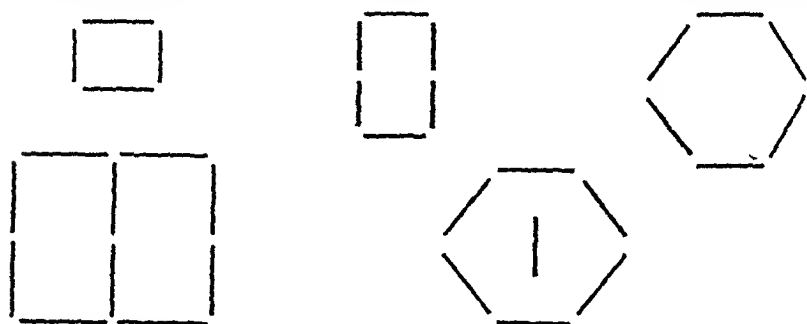
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The treatment is, of course, an alpha ray technique. The action is superficial, because the penetration of the alpha ray is very slight. The ointment is rarely used—varnish is the most popular vehicle—but the alcohol solution is also frequently employed. As is customary with such substances, the first type of lesion to show satisfactory results to this form of treatment is that of neurodermatitis. Like Grenz rays, thorium X application can be used safely in areas which are hairy.

Alopecia areata.—Corsi (1943) showed that some areas painted with thorium X grew hair quicker than those not so painted, and he concluded that thorium X was of value in a certain proportion of patients suffering from alopecia areata. Feeny, at Oldchurch Hospital, has treated 50 cases of alopecia areata by painting once monthly with 1,500 ESC thorium X per c.cm. of varnish. The results were definitely superior to those obtained by the use of local light treatment. There can be little doubt that thorium X does provide an additional helpful weapon for use in the treatment of alopecia areata.

Angiomas (nævi).—The action of thorium X is too superficial to be of any use in the treatment of cavernous nævi. In capillary nævi, particularly the nævus flammeous type, it has been most used in the form of the varnish painted weekly or every few days. At the London Hospital, however, it is applied once only, and then a long period (several weeks) is left for the effect to pass off completely. This method makes treatment very tedious, but it does result in definite improvement in the nævi with the minimal chance of the development of skin atrophy and telangiectasia. I have usually found that the strawberry and similar types of nævi are so amenable to other forms of treatment (or with patience they may disappear spontaneously) that it is not necessary to use this somewhat expensive type of therapy.

Psoriasis.—Perhaps the most striking use of thorium X is in the treatment of psoriasis. Patches on the body which have had the scales removed by ointment yield well to weekly applications of thorium X. It is also one of the best methods of treating psoriasis of the face. In addition, psoriasis of the finger nails, which is otherwise almost hopeless, yields a fair proportion of successful results. Another almost hopeless condition, i.e., tinea of the nails, is cited by Corsi (1943) as, in a certain number of cases, being cleared up by the use of thorium X dissolved in alcohol and applied weekly for many weeks.

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- Airey, F. S., and Feeny, P. J. (1945): *Proc. roy. Soc. Med.*, 38, 142.
 Burrows, A. (1935): *Med. Pr.*, 191, 301.
 Corsi, H. (1943): *Lancet*, 2, 346.
 Lomholt, S. (1936): *Ibid.*, 29, 1401.
 Paterson, R. (1934): *Brit. J. Radiol.*, 7, 592.
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resist treatment can be well treated by the use of radon seeds, provided the blood supply is adequate. These seeds are buried at the rate of 1 per square centimetre and left in position for one to three days.

OTHER SKIN CONDITIONS RESPONSIVE TO RADIUM.—The skin conditions in which the radium plate has been most useful are those in which most other radio-therapeutic methods have been reported to be more or less successful, for example, neuro dermatitis, pruritus ani et vulvæ, and psoriasis. Exposures with the usual radium plates are mostly given unscreened for a matter of minutes.

BETA AND ALPHA RAYS

In 1936, Dr. Lomholt, of the Finsen Institute, Copenhagen, in a lecture to the Dermatological Section of the Royal Society of Medicine on alpha and beta rays in skin therapy, dealt with the use of radon and thorium X for this purpose. He laid particular stress on the results obtained by beta therapy. It was shortly after this lecture that thorium X treatment was first carried out in this country, at St. Bartholomew's Hospital.

Lomholt's method of employing beta rays was as follows:—

Radon or radium emanation was absorbed in wax plates, by this means making use of the beta ray obtained from the active deposit thus fixed. Such wax plates were 2 mm. thick and of a strength of 0.02 to 0.1 mc. per square cm., and they could also be cut to the shape of any lesion to be treated. Dosage was commonly in the region of 0.6 to 1 mc. hour.

He found such radio-active plates most useful in the treatment of psoriasis, particularly of the nails, and was much impressed by their use in cases of neurodermatitis. In this last condition, as well as in cases of keloid or hypotrophic scars, he claimed the treatment to be superior to all other methods. He used it also in examples of chronic infiltrated plaques of eczema. He gave a warning against over-treatment and the possible development of late telangiectases. This form of treatment has not been developed to any extent in Great Britain, but it is possible that more may be done in the matter in the future. No-one denies the value of such therapeutic methods, but the real test is whether they are superior to the techniques which are already in operation.

THORIUM X

This substance belongs to the group of radio-active metals. On the Continent, as has already been mentioned, its use in solution has been developed for the treatment of skin diseases. English suppliers of the substance make it up in three forms, i.e., in solution, either in alcohol or varnish, or in ointment, using a euceryl base. Dosage is given in electrostatic units—a very minute quantity. The usual strength supplied is 1,000 units in alcohol, but 1,500 units in varnish, owing to the latter's screening effect. The manufacturers say that 1 c.cm. of alcohol is sufficient to cover 100 square cm.

depends partly upon their previous temperament, and partly upon the severity of brain concussion. Some accept their ill-luck without complaint and make themselves fit again as soon as possible. Many, however, need help from those around them. In the early days after recovering consciousness it is easy to start worrying: anxiety about the future, whether he will be able to work and to play, and to mix normally with his friends; these and other fears may make the patient nervous, irritable, depressed and sleepless. If symptoms of this kind are not counteracted, recovery may be seriously delayed, and indeed invalidism after head injury may be caused by a bad nervous reaction to the accident, even when the actual damage to the head is slight.

Friends and relations have a special responsibility when visiting the injured in hospital or when welcoming them home. They must realize that the patient may feel strange and ill at ease. The purpose of this pamphlet is to show how to help, but remember that no two cases of head injury are alike, and much of what is written here will have nothing to do with your case.

In view of what has been said, it is obvious that while in hospital and during convalescence the patient should be surrounded by an atmosphere of cheerfulness and optimism. He has been longing to see you, and you must make him feel that he is to you his old much-loved self. A man recovering from head wounds is often like a perplexed child who craves security and extra affection. The rate at which he recovers his self-confidence will largely depend upon those with whom he lives. If he is able to talk sensibly to you within a day or two of the accident he will probably be quite fit in a few weeks. If he remains confused for over a week, recovery is likely to be slower and may be less complete. Do not worry about fractures of the skull; they heal well, are usually of little importance and seldom delay recovery.

ADVICE ON VISITING THE HOSPITAL

The following points are important:—

(1) If possible, before seeing him, find out from the ward sister or doctor how severe the injuries are and whether progress is satisfactory. If ever you want advice or information on any particular point do not hesitate to ask the sister or doctor.

(2) In the early stages after a head injury he may be confused and bewildered, uncertain where he is and unable to recognize his friends. He may not know that he has been concussed; if he is able to understand, you may help by telling him where he is and that he has had an accident from which he will soon recover. When his mind is clear, he will want to know more about the accident, but be careful not to give him a frightening account.

CONVALESCENCE AFTER HEAD INJURIES

ADVICE FOR THE PATIENT'S RELATIONS

BY W. RITCHIE RUSSELL, M.D., F.R.C.P.

AND M. J. McARDLE, M.B., M.R.C.P.

From the Neurological Department, Radcliffe Infirmary, Oxford.

THE importance of graduated physical and occupational training in convalescence after head injuries is now fully recognized, and these methods are being successfully used, especially in the Services.

After severe cerebral contusion, with or without fracture of the skull, there is often a liability for the patient to suffer from headache, giddiness, nervousness, fatiguability, reduction in mental capacity and minor change of personality. The actual *disability*, however, which these symptoms cause varies enormously, and often seems to depend as much upon the patient's personality and environment as upon the severity of his injury.

It is quite evident that a healthy attitude to his symptoms and physical disability is of great value in hastening convalescence, and in preventing the development of a post-concussional neurosis with all the suffering and misery which that may cause. It is here that the friends and relations of the convalescent can do more than anyone else either to help or hinder recovery.

We have for long felt the need for some instruction to the relatives of these patients, something more precise than can be given in a short interview, and have therefore written the following to be reprinted as a pamphlet which can be given to relations after admission to hospital.*

GENERAL PRINCIPLES

Everyone knows that very severe brain injuries may cause damage to physical and mental health. It is not so generally known, however, *that nine out of every ten patients admitted to hospital with head injuries make a quick and excellent recovery.* Modern treatment has greatly reduced the mortality from these injuries, so much so that if the patient survives the first twenty-four hours after injury he is then usually out of danger; from then onwards he will continue to improve. In a *few* cases, recovery is delayed or incomplete, and symptoms such as headache, dizziness or lack of concentration may persist for some time afterwards. Even when such symptoms persist it is exceptional for them to cause serious disablement or to prevent work. Remember also that late complications are rare.

Patients react differently to the experience of having a head injury. This

* For details concerning this pamphlet see p. 404.

with the doctor or social worker. There is also a false belief in the lay mind that insanity may develop long after a head injury; fortunately, this fear is without foundation. Fears and worries of this kind may make the patient nervous and depressed and thus seriously delay his recovery; it is most important to correct them as early as possible.

(10) As he improves, it is a good thing to start planning with him his convalescence and return to work. The hospital almoner or social worker will help you. The doctor will give you some idea of when he will be fit to resume work and what work he will be fit for. If he is advised to start with light work, find out how his employer can help, and, if necessary, the Disablement Rehabilitation Officer to the Ministry of Labour Office should be consulted. In severe cases, light or part-time work may be necessary at first, and for the worst cases special arrangements have to be made. In any case *a good plan for convalescence and for return to work will help the patient enormously*. When the patient's home is noisy or tiring in some other way, a few weeks spent at a convalescent home are a great advantage.

CONVALESCENCE AND RETURN HOME

During convalescence in hospital, it will soon be obvious to you if the brain has been severely damaged. In such cases, there may be paralysis of the limbs, disturbance of speech, difficulty in following conversation, severe forgetfulness or inability to remember names of friends and places he knows quite well. Convalescence must, of course, be adapted to the degree of incapacity, but if he has been severely injured, *we would earnestly plead with you to determine to sacrifice yourself to his interests and welfare, for a time at least, so that he can get the benefit of a happy return home*. This will do him more good than anything, and as his wife, mother or friend, you will be undertaking the magnificent task of helping him to the best possible health; no-one else can do this as well as you who live with him.

The return home should be as quiet as possible; he may be tired after the journey and, if so, should go to bed early; inquisitive visitors will just worry him. He will ask to see his friends when he feels like it. Let him "potter about" and do nothing for a time. If the noise of the children worries him, try to send them away to stay elsewhere. Suffer his faults without complaint, avoid what irritates and never indulge in nagging.

As a rule he himself is the best judge of what he is fit for and can be left to do what he likes; the more he is occupied the better. He should not be irritated by being told not to do this and that. If what he does makes him feel ill, it will do no serious harm and he should do less next time. When he starts going to the cinema, football match or "pub", it is often wise to go only for a short time at first—alcohol is better avoided. If he is very keen to visit the "pub" someone should go with him who will look after him, and see that he has only one moderate drink.

(3) You must conceal all fear and anxiety from your eyes and speech. Remember that he has been looking forward to seeing you, and you must make him feel how glad you are to see him. If you have talked to the sister, you will probably be able to tell him that the doctor is pleased with his progress and that he will make a good recovery before long. Always give him this good news if you can. The doctor or sister should have already told him, but this is often forgotten in a busy ward. Neglect of this simple advice leads many patients to remain highly apprehensive long after they are out of all danger.

(4) You should bring him all the good news you can. *You must on no account burden his thoughts with your own worries or difficulties.* If you need help or advice, you should ask the ward sister or hospital almoner.

(5) You must guard your tongue carefully:—

Never make upsetting comments on his health or appearance.

Tell him he is looking better if you can.

Never bother him with questions which worry or puzzle him.

Never admit that he is "changed" in any way.

Never speak of others you know who have not recovered well from head injury. Talk of someone he knows who made a complete recovery.

(6) Loss of memory for the accident itself and for events for a varying period both before and after is to be expected. But some patients worry about this gap in memory and need to be told that it always happens after concussion and is nothing to be alarmed about; no effort on his part will recover it.

(7) Always appear confident and cheerful. Do not encourage him to lie still and do nothing. If he feels like moving about or reading, he should, even though it may give him a slight headache. An interesting occupation, provided it does not strain him unduly, is always good.

(8) You may ask him how he is feeling, but do not ask him in detail about his symptoms, for the less he thinks about them the better they will be. In particular do not keep asking him if he has a headache or "sore head". Many patients never have a headache after severe head injuries, and prolonged headaches are as often caused by nervousness, anxiety and depression as by the direct injury to the head.

(9) If he seems worried or anxious, you should encourage him to discuss his difficulties frankly with the doctor and tell him what is "on his mind". Reassure him yourself whenever you can. He may be worried about conditions at home, his future capacity for work, or perhaps some legal or financial situation arising out of the accident. Many of these worries may be more imaginary than real and can be settled or lessened by a frank discussion

with the doctor or social worker. There is also a false belief in the lay mind that insanity may develop long after a head injury; fortunately, this fear is without foundation. Fears and worries of this kind may make the patient nervous and depressed and thus seriously delay his recovery; it is most important to correct them as early as possible.

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Never speak of others you know who have not recovered well from head injury. Talk of someone he knows who made a complete recovery.

(6) Loss of memory for the accident itself and for events for a varying period both before and after is to be expected. But some patients worry about this gap in memory and need to be told that it always happens after concussion and is nothing to be alarmed about; no effort on his part will recover it.

(7) Always appear confident and cheerful. Do not encourage him to lie still and do nothing. If he feels like moving about or reading, he should, even though it may give him a slight headache. An interesting occupation, provided it does not strain him unduly, is always good.

(8) You may ask him how he is feeling, but do not ask him in detail about his symptoms, for the less he thinks about them the better they will be. In particular do not keep asking him if he has a headache or "sore head". Many patients never have a headache after severe head injuries, and prolonged headaches are as often caused by nervousness, anxiety and depression as by the direct injury to the head.

(9) If he seems worried or anxious, you should encourage him to discuss his difficulties frankly with the doctor and tell him what is "on his mind". Reassure him yourself whenever you can. He may be worried about conditions at home, his future capacity for work, or perhaps some legal or financial situation arising out of the accident. Many of these worries may be more imaginary than real and can be settled or lessened by a frank discussion

who are contented, not worried and suitably occupied. If they develop with unexpected severity and with fever or drowsiness the doctor should be called to see him.

Giddiness.—Slight giddiness is not uncommon after head injury, and it need cause no anxiety. It may be brought on by quick movements of the head or by getting up on to the feet suddenly. This last type can be controlled by lowering the head, and all forms improve with exercises, which should include some stooping and head movements. As he becomes physically fit, the tendency to giddiness or faintness will improve steadily; work at which a faint would be dangerous should not be allowed until full recovery has been reached.

Nervousness.—This is common in those who have not yet recovered their self-confidence. It usually lessens in time. Some of the fears and doubts which cause and aggravate it have been mentioned earlier and should be dispelled at an early stage. Some people after an accident "lose their nerve" for dangerous work, such as mining, working at heights or even driving a car. This is less common in a person of robust temperament, but if he is seriously worried at the thought of his old job, he should take up some simple, quiet employment until he regains his self-confidence.

Forgetfulness and difficulty in concentrating.—At first, difficulty in concentration may be disabling for those with highly technical administrative or other responsible work. Many men adapt themselves well to moderate loss of mental capacity. They may have to work more slowly, prepare more carefully and keep a careful note of appointments, but in time they often resume responsible work quite successfully. It is disappointing not to have the same quickness of thought or good memory as before the accident, but it should be accepted with patience and allowed for. In itself it is rarely a handicap to happiness or success; spirit and character are more important. It is essential, as has been mentioned, that work well within the patient's capacity should be tried first. Sometimes a change of occupation is desirable. Mental work does no harm, but if it proves to be very tiring this means that he should do less for a time.

Other complications and symptoms are so uncommon that they will not be considered here. These notes cover most of the problems with which you may be faced. If you have other medical or social questions to ask, you should consult your doctor.

All forms of exercise, especially in the open air, will do him good but, like everything else, it must at first be well within his powers and increased gradually. Stooping and quick movements of the head may be difficult at first, but should be practised gently, as this helps them to improve. Reading may also be tiring, but with practice will gradually become easy; glasses will sometimes help. Let him attempt any odd jobs or hobbies. The satisfaction he gets from making something with his hands will help.

He should call to see his doctor soon after getting home. You should show this pamphlet to the doctor, and he will advise you regarding any special circumstances for your case. A medical report should reach your doctor soon after the patient gets home.

RETURN TO WORK

The best time to return to work depends upon the individual, the severity of the injury and the type of work. Work can usually be resumed in from two to four months from the date of the accident. This should not be delayed by minor post-concussional symptoms, such as liability to headaches and dizziness. It is best sometimes to start with part-time or light work. As with all other activities, recovery by gradual stages should be the rule, and if he has bad days, he should take a day off from work from time to time. If his normal work is highly skilled and requires quick action of brain or hands, it will often be preferable to start with some more simple task, even when this involves loss of wages. Work is the best tonic in most cases but this should be well within the patient's capacity, both from the mental and physical point of view. Failure at the first job is depressing and may cause loss of confidence; so be sure that it is not too difficult. At first he may get easily tired, but this will improve if the work suits him. He should go to bed early. If his work is simple manual labour and his limbs are normal, he will probably recover his full earning capacity within six months of the injury, but if his work is highly skilled and involves much responsibility and quick action, it sometimes happens in rare cases that his earning capacity is reduced by a severe injury, and that his prospects of advancement are interfered with. This may prove a serious matter for wife or dependants, yet it is essential that you should accept your altered circumstances without fear or complaint, less the patient should be made ill by a feeling of failure.

NOTES ON SPECIAL SYMPTOMS

Head pains.—About half of those who have head injuries continue for many months to have headache from time to time. This is usually of no importance and is relieved by a short rest or by 10 grains of aspirin, or compound tablets of codeine. Headaches are much less frequent in those

reported excellent clinical results in patients with intestinal obstruction, some of whom showed actual increase in the serum proteins.

Severe burns.—Another indication is excessive loss of protein, more than can be made good by ordinary food. The outstanding example of this condition is in the severely burned patient. There is general agreement concerning the excessive loss of nitrogen after burning (Cope *et al.*, 1943; Taylor *et al.*, 1943; Anderson and Semeonoff, 1944), and this becomes one of the major problems in treatment after the first few days. The loss occurs both by way of the urine, and in the copious exudate from the burned surface. Unless it can be made good, there is a progressive lowering of the plasma protein, with the formation of œdema, and healing is delayed because the skin grafts do not take. The patient is usually unable to take sufficient protein food by mouth to balance this deficit. The administration of hydrolysates, either intravenously or by tube-feeding, to these patients has met with considerable success, both in balancing the nitrogen and in restoring the level of plasma proteins. A case which has now become classical was described by Taylor *et al.* (1943).

A man with a severe burn, showing excessive loss of protein, and œdema, despite a diet containing 130 gm. of protein, was given amino-acids by vein and stomach tube to the extent of 300 gm. per day. This forced alimentation resulted in a striking disappearance of the œdema, and a rise in the plasma protein.

In a recent paper, Co Tui and his collaborators (1944) have for the first time measured the nitrogen loss through exudation from burned surfaces; they estimated the nitrogen lost into the dressings, and obtained a minimum figure of 5 gm. per day in two severely burned patients. In patients with burns involving 10, 30, and 50 per cent. of the body surface, nitrogen balance was maintained by feeding with protein hydrolysate and dextrin-maltose; the amount of nitrogen required increased with the severity of the burn, and in the case of the 50 per cent. burn reached 66 gm. of nitrogen per day, which, as the authors point out, is equivalent to 2 kgm. of meat, an impossible amount to feed.

Other surgical conditions.—As regards surgical conditions other than those described above, the hydrolysates have been used successfully by Elman (1943) for intractable diarrhœa following enterostomies, and by Brunschwig, Clark and Corbin (1942) to overcome post-operative loss of nitrogen. These authors conclude that the most important factor in the post-operative loss is the restricted intake of food, combined with the general disturbance of the operation. They found that casein digest and glucose given intravenously reduced or prevented this loss.

In many of the other surgical conditions for which hydrolysate therapy has been recommended, the usual difficulties in evaluating non-specific treatment are met with. Conclusions are to a large extent dependent upon clinical impressions; e.g., a more rapid convalescence after severe operations is claimed as one of the advantages of hydrolysate therapy.

PROTEIN HYDROLYSATE THERAPY

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PROTEIN therapy in general has received more attention recently, since the effects of protein deficiency in various diseases have come to be more correctly appreciated. The increased use of blood and plasma transfusions in medicine and surgery which has resulted from the stimulus of war conditions may have been in part responsible for this renewed interest.

Whilst partly predigested protein foods in the forms of digested milk and beef, or "peptonized milk", have been in use for some time, these digests have to be specially prepared for the individual and, as the protein has undergone but partial hydrolysis, they can be used for oral administration only. Although complete digests of protein had been used for years as nutrients for bacterial growth, it was not until 1938 that a preparation of hydrolysed protein was administered intravenously to human beings by Elman and Weiner (1939). Since then, various protein hydrolysates have been given to patients, both by mouth and intravenously. This work has been done chiefly in America, and suitable intravenous preparations have only recently become available in this country. They may be described as either acid or enzymatic digests of casein or meat. The hydrolysis is carried out until the protein is broken down to a mixture of amino-acids and polypeptides. The solution should be free from proteins, proteoses, or peptones, which would cause anaphylactic reactions if administered intravenously. For oral administration, the digests can be obtained as fine, light powders, hygroscopic, easily soluble in water, and having the appearance of a yellow or light brown dried milk.

For convenience, the applications of hydrolysate therapy may be considered first in surgical, and secondly in medical practice.

USE IN SURGERY

The most obvious indications for the use of hydrolysates in surgery are in cases in which there is inability to ingest protein food because of *intestinal diseases*, e.g. intestinal obstruction, or persistent vomiting. Elman and Weiner (1939), in their original paper, reported on two cases of intestinal obstruction and three of carcinoma of the stomach, all of which benefited from intravenous therapy. The hydrolysates were well tolerated, and positive nitrogen balances were obtained. In a later paper, Elman (1942)

The amino-acid mixtures have been suggested for the treatment of *cirrhosis* and *toxic hepatitis* (Beattie and Marshall, 1944). Their value here would probably be due to the content of cystine and methionine, and better results would be obtained by direct treatment with methionine.

Milk allergy can be treated with casein digests, because these are non-antigenic. Hill (1941) treated a number of allergic infants under a year old with a food containing amino-acids in place of milk; the children received this mixture for as long as three months, and satisfactory results were obtained in about half the number. A similar synthetic food with protein hydrolysate in place of protein has also been used for adults suffering from *food allergy* (Olmstead *et al.*, 1944).

TECHNIQUE OF ADMINISTRATION

The hydrolysates can be administered by the intravenous, subcutaneous, or oral routes. For *intravenous administration*, a 2.5 per cent. solution in water with 5 to 10 per cent. glucose is generally used. Stronger solutions tend to produce thrombosis. The pH of most preparations is in the region of 4.5, and it has been suggested that a solution neutralized to pH 6.5 is more satisfactory and can be used in greater strength (Elman, Weiner, and Bradley, 1942). The solution, which must be free from pyrogens, is given slowly, about one litre at a time over two hours, the rate being adjusted to the reaction of the patient. The untoward reactions which may be observed are nausea and vomiting from too rapid injection, mild pyrogenic reactions, and thrombosis at the site of injection. When intravenous injection is difficult, the solutions may be injected into the bone marrow (Altshuler *et al.*, 1943). If intravenous medication forms the sole supply of food, it is desirable to add vitamin concentrates to the fluid, as well as carbohydrate. It must be borne in mind that these hydrolysates are perfect culture media, and great care must be taken to prevent bacterial contamination before use.

The oral route, which is the only one I have used personally, presents some difficulties. Many of the tryptic digests of casein have an objectionable taste in greater or less degree, although the papain digests of meat are quite palatable. The objectionable taste of casein digests cannot be removed by dilution, and it is a mistake to give them in the form of a dilute soup. If patients find difficulty in taking the solution, I have found that the most satisfactory way to give small quantities is to make up a strong dose, say 15 gm. of the powder in 2 oz. of water, neutralize with sodium bicarbonate, and flavour heavily with aniseed oil. This mixture is swallowed rapidly, and followed by a draught of water. In this way, 60 gm. may be given easily in the day. If a larger intake is desired, and the taste is too objectionable, recourse must be had to tube feeding into the stomach or jejunum.

Oral feeding with digests must be supplemented with adequate glucose or other carbohydrate, as in the case of intravenous alimentation; otherwise

USE IN MEDICINE

The indications for hydrolysates in medical cases are not so clear-cut as in the surgical conditions described. There would appear to be an indication for this therapy when there is a loss of ability to digest or absorb protein, as in *ulcerative colitis* and *gastro-enteritis*. Good results in ulcerative colitis have been claimed by Elman and Weiner (1939), and Messinger (1943). In gastro-enteritis in infants, Shohl (1943) has reported that when casein hydrolysate was given, the infants had good positive nitrogen balances, but that this was not the case when milk was given. Positive balances were obtained when the nitrogen intake was 0.35 gm. per kgm. body weight per day. The value of hydrolysates in treating children is confirmed by Hartman *et al.* (1944). On the other hand, verbal reports on the oral use of hydrolysates in infantile gastro-enteritis in this country indicate that, although hydrolysates are well tolerated by the infants, they do not appear to affect the mortality rate.

The hydrolysates would appear to be suitable for the treatment of *starvation*, and early reports from India were most encouraging. An opportunity to try this form of therapy in starvation on a large scale occurred in Belsen camp. The details of this investigation have been given by Vaughan, Dent, and Pitt-Rivers (1945), whose report is on the whole unfavourable, although they admit that in different circumstances the hydrolysates might be more successful. The same conclusions were reached in treating starvation in western Holland where, by contrast, skim milk powder gave highly satisfactory results (Burger, Stanstead, and Drummond, 1945).

On the other hand, intravenous hydrolysate therapy has been reported by Messinger (1943) to bring about a return of appetite in severe anorexia. The administration of hydrolysates, either orally or intravenously, would appear to be indicated in the dietary treatment of *anorexia nervosa*.

In diseases in which there is evidence of impaired digestion or absorption of protein, such as *cœliac disease* in children, *idiopathic steatorrhœa*, and *chronic pancreatitis* in adults, it seems reasonable to try hydrolysate therapy. The successful treatment of cœliac disease with a papain digest of meat given by mouth has been claimed recently in this country by Adamson and Lewes (1944).

In my own experience with casein digests administered by mouth to patients with idiopathic steatorrhœa or cœliac disease, I found that, whilst the preparations were well tolerated, and balance experiments showed that the greater part of the nitrogen of the digests was absorbed, yet, with the exception of one case, no marked effect on the general condition could be demonstrated. The exception, a cœliac dwarf boy aged fifteen, whose height had been stationary for at least a year, showed considerable growth in height and increase in weight after oral hydrolysate therapy. The anæmia, present in some of these cases, remained unchanged.

THE HYPOPIETIC PATIENT

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THE distinctive sign of hypotension in the adult is a maximal systolic blood pressure of 110 mm. Hg or less. A diastolic minimal pressure ranging below 70 mm. Hg, which is confirmatory, often remains undetermined because of the transitional sound being indistinct or inaudible. Although subnormal for the adult, a systolic pressure lower than 110 mm. Hg is not incompatible with an active, even energetic, life, and may not reveal itself unless or until it becomes a feature of associated disease.

CLASSIFICATION

Cases fall easily into place in one or other of two clearly definable groups:—

Hypotension	{ Primary or essential (hypopiesia)	{ Sthenic:—of natural occurrence; the so-called permanent type; symptomless; comprising the active and athletic
		{ Asthenic:—temporary, symptom-producing, with a disposition to hypotensive attacks; the ambulatory, common, consulting-room case
	{ Secondary (hypopiesis)	{ Symptomatic—of coexisting disease

In the patient consciously ill from too low a pressure or a fallen pressure, there are a number of accompanying symptoms, for the most part subjective, which, taken together, point to hypopiesia of a degree to be measured by the sphygmomanometer. The patient is usually ambulant, going about his business as usual, but in anxious doubt about his health because of spells of dizziness and weakness. An established diagnosis of hypopiesia should be based upon a series of instrumental recordings, taken by the stethoscopic method, say, weekly—not on a single, solitary measurement.

THE CLINICAL FEATURES

A disposition to fleeting hypotensive attacks induced by emotion, more often by digestive disturbance, may as a leading sign bring the disorder to light. The main symptoms are:—

(1) Dizziness on change of posture to the upright—"postural hypotension"—occurring suddenly, giving rise to apprehensive fear with loss of self-confidence that drives the patient to seek medical advice.

(2) Asthenic attacks when, perhaps for the space of hours or a day, feelings of weakness overcome the patient to deprive him of the power of physical, although seemingly not of intellectual, effort.

(3) Inability to remain standing for more than a few minutes without this inducing faintness, pallor, sweating, nausea, even vaso-vagal fainting with loss of consciousness; hypopietics are bad standers.

the amino-acids will be burnt to supply energy instead of being used for protein building.

SUMMARY

In surgery, the protein hydrolysates appear to be of value in the treatment, both pre- and post-operatively, of patients in whom the intake of protein food is limited or prevented by the condition present, or when there is excessive loss of protein in a severely ill patient, as in cases of burns.

In medicine, the indications for therapy are not so definite. It may be of value in ulcerative colitis and gastro-enteritis. Whilst it is not necessary in the treatment of starvation, it may be worth trying in anorexia. In a number of other diseases, such as the steatorrhœas, the value is as yet uncertain.

This form of therapy is still in the experimental stage, and has perhaps suffered, as many other new forms have, from the over-enthusiasm of some of its advocates. Much work has yet to be done before the final word can be said. The least that can be said at present is that administration of protein hydrolysates by the oral route will certainly not do the patient any harm, which is more than can be claimed for most new therapeutic substances.

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the minimal adult daily allowance of all fluids being four imperial pints.

When hypopiesia is symptomatic, as in coronary occlusion, adrenal insufficiency, or other malady, treatment is that of the concomitant disease.

RECAPITULATION AND CONCLUSION

Hypotension can be taken to be real and subnormal if additional symptoms show up to confirm the diagnosis. Significant amongst these are asthenia, dizziness while upright, and inability to stand about. Essential hypopiesia must be distinguished from hypopiesia symptomatic of other present disease: the two will be differentiated by collating all symptoms and signs, and by repeated pressure readings.

For years I have watched a number of hypotensive patients, all males, until I can recognize the type with some certainty, possessing symptoms as described, lasting days or weeks, with pressures ranging far below the normal for their particular years; they had become apprehensive, and had lost confidence in themselves, feeling less capable physically, less tenacious of life than ordinarily. Hypopiesia is of higher incidence these days, a probable aftermath of the war. During the war years, attention was repeatedly drawn to the disorder amongst those compelled to stand whilst at work, particularly in active painters, bench workers and machinists, who were debilitated, and oftener in men than in women.

The chief incidence of hypotension is in youth and middle-age; by its persistence into later life it induces a limitation of effort and compels a constant slowing of the pace in the few elderly people afflicted. There is ample evidence that abnormally low pressures do not reduce the expectation of life; on the contrary, such low pressures are known to increase it. Not seldom, hypopiesia is found to sow the seeds of neurasthenia; harnessed together, each is liable to perpetuate the other. It is wrong to label such persons as neurotic only. In this way, a vicious circle is set up. If there is a neurotic element in any particular case, it is comparatively unimportant. Not all that are hypotensive are introverts; some are known to me to be busy, cheerful extroverts with a keen sense of humour, unconscious of self, when symptoms do not encroach overmuch on their attention.

Most often seen in men, essential hypotension is rarely if ever found in women, who normally possess a higher average level of blood pressures, especially after the menopause. Reassurance and sufficient rest and sleep are needed, not omitting massage and regular physical exercises practised at first in the recumbent position. No drug is altogether suitable. In the ambulant patient the remedy is a supporting, low-placed, broad abdominal web belt, firmly adjusted; this is usually declared by the sufferer to be a helpful, invigorating part of the treatment.

Whereas the hypertensive bounds his way through life to die in the sixties, if not before, from sudden, expected complications, the hypotensive lives a quiet, steady-going, useful life, talks little and works more, to die in old age not from hypotension but from something else altogether, if he does not succumb earlier to an arterial thrombosis.

(4) High-coloured, cyanotic skin with sluggish terminal circulation in the nose, cheeks, ears, fingers and toes; intolerance of cold.

(5) Awareness while at rest of throbbing pulsation in the head, hands and feet, synchronous with the pulse beat.

(6) The state is not uncommon in young and middle-aged men of spare build and steady, competent, unaggressive habit; unusual in women and in the obese; not found in the (? belt-wearing) labouring man.

(7) "Near faints" with momentary black-outs, with complaints of seeming to "go all to pieces" and of feeling powerless, even to think.

(8) Hypopietics need long sleep; as if lengthy hours of rest are called for to recover energy enough for the next day's work.

PATHOGENESIS

However the cause is considered, the inference to be drawn is that asthenic hypopiesia is brought about by lack or loss of vasomotor tone and control, with resulting capillary stasis. For this reason, blood would appear to pool in the roomy splanchnic circulation, to slow the blood flow and conduce to faulty aeration; perhaps to deplete the more distant parts of the body. It has been suggested that the muscularly weak, slack abdominal wall favours this happening; but an oppressive hypotension is not seen in women, whether parous or otherwise, being most often detected in men. One reason for this may be the habit in women of wearing corsets. Going a step further back, a functional neuro-muscular atony of some cause and kind must underlie the vasomotor imbalance, itself of constitutional or autotoxic origin, or both. Heredity is believed to dispose to the condition in a few.

MANAGEMENT

An abdominal belt is a first necessity, applied low down over the hips to give firm support and uplift to the abdomen. The best type for constant use is the ostler's broad, buckled, web belt, which is strong and lasting; this should be fastened over shirt or trews. The so-called surgical belt, as usually designed, is useless. The belt is worn when up and about, not while in bed. If feelings of faintness or dizziness occur, the patient should tighten the belt and lie down until recovered. In his belief in the solid benefit felt by wearing the belt, he will cling to it tenaciously.

As to *drugs*: temporary, though evanescent, rises in pressure are effected by amphetamine, although caution in its use is necessary; so also with adrenaline or ephedrine. Particularly in the elderly, attempts to raise the pressure by the giving of drugs that exert a forcible pressor effect may prove dangerous; in any case, the method seems to be uncalled for and is unsafe. Neither is the raising of pressure by any medicament, although succeeding for the moment, likely to be continuous or controllable enough at any time for the end to justify the means. As interval remedies, for extended use, the best are iron in massive dosage, medicinal glucose in quantity, and strychnine, any and all of which are indirectly valuable.

Diet.—A full mixed ordinary diet is indicated, with adequate hydration,

utricle and three semi-circular canals, which contain endolymph and are themselves contained in the bony labyrinth from which they are separated by perilymph; (2) the scala media, a membranous tunnel containing endolymph, which spirals round in the cochlea to its apex (helicotrema) where it ends blindly, and is connected near the base of the cochlea with the saccule; this scala media contains the auditory organ of Corti; (3) a ductus endolymphaticus leading from the saccule to the saccus endolymphaticus. In Ménière's disease the membranous labyrinth is distended by endolymph and it is thought that acute rises of endolymph pressure precipitate the attacks of vertigo. Sooner or later distension of the scala media affects the organ of Corti and causes deafness and tinnitus. Whether this "hydrolabyrinth" is caused by decreased absorption, ("glaucoma"), or increased production or increased osmotic pressure of endolymph, is not known. In this country, Wright (1938) holds that focal sepsis is an important factor in etiology and compares the condition to iritis. Danish writers have long believed that the disease is a local expression in the labyrinth of a general disorder of metabolism of salt and water, either from excessive ingestion of these substances or from constitutional retention of fluid in the tissues, such as occurs in heart failure, nephritis, certain pituitary-hypothalamic disorders, and peripheral vascular disorders, which they find occur not infrequently in their cases. In America, Furstenberg (1941) attaches much importance to retention of sodium and restricts its intake, giving ammonium chloride to increase elimination.

Disorders of the vessels which produce endolymph have been held responsible for these anatomical changes in the labyrinth. Endolymph is secreted by branches of the internal auditory artery, a branch of the basilar artery which is formed by the vertebral arteries. Arteriosclerosis of these vessels is thought to cause Ménière's disease in many cases in middle and old age. Miles Atkinson (1943) and others have been attracted to other vascular theories, such as local vasodilatation as a result of allergy, which apply to younger patients as well. In this connexion it is interesting to note that Ménière himself pointed out how akin some of these cases are to migraine, and that allergy may play a part in both conditions, and that tobacco and tea, which have vasoconstrictor and vasodilator effects, have long been held to be of importance in etiology.

A third case illustrates the occurrence of labyrinthine vertigo and migraine in the same patient:—

A man of thirty-five complained of (1) bilateral occipital *headaches*, which came in attacks lasting about three hours, about twice a week during the last year, and were preceded by blurring of vision and "jagged lights", which began in the lower left field of vision about half an hour before the headache started, but extended over the whole field and disappeared just before the onset of the headache. (2) Five or six *attacks of vertigo* during the last six months, each lasting for three minutes, during which time objects seemed to spin around in a horizontal direction and he had to grasp something and lie down and close his eyes to stop falling and vomiting. Several of these attacks were also followed by bilateral occipital headache which lasted for several hours. (3) *Attacks of falling*, three during the last six weeks, which on each occasion came on suddenly without warning if he turned his head suddenly.

MÉNIÈRE'S DISEASE

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IN 1861, Prosper Ménière of Paris clearly described labyrinthine vertigo. The patient, who is often a middle-aged man, develops recurring attacks of vertigo, accompanied by nausea or vomiting, pallor and sweating, and sometimes cyanosis. The attacks usually last for a few minutes to a few hours, and a few may occur within a short period of time, after which he feels well for days, weeks, or for years, until the next attack. The attacks may be so severe that he falls to the ground, or cannot raise his head from the pillow without intense vertigo and vomiting, or faints, or is afraid to go out into the road without a companion, or may even remain indoors in bed; or they may be mild and transitory. Either before or after the onset of vertigo, deafness and tinnitus develop. Sometimes they at first come only during an attack and sometimes only in one ear, but sooner or later they usually become permanent, progressive and bilateral. In the attacks there is always nystagmus, occasionally transient loss of vision or diplopia, and often headache, which may precede or follow the attack and may be unilateral.

Two forms of this disease should be better known:—(1) Clear-cut attacks of vertigo recurring for years before deafness or tinnitus is noticed. (2) Attacks of vertigo associated, not only with vomiting, but with abdominal pain and diarrhoea, so that the case may appear to be one of primary recurrent abdominal disorder. This widespread disturbance of the vegetative system which may occur in the attacks may also cause epiphora, salivation, vasomotor rhinitis, urgency of micturition or defecation.

Illustrative cases

Case 1.—A man of twenty-seven complained of nine attacks of acute giddiness during the preceding fourteen months. At the onset of each attack he would lurch violently from side to side until he lay down, when he would develop acute giddiness on raising his head, until after one-and-a-half to three hours the attacks would suddenly pass off and he was able to resume his work. At the onset of the first attack there was an urgent desire to micturate. With the last attack there was profuse sweating. There was not a true sense of rotation, a usual, but not essential, attribute of labyrinthine vertigo. The patient was not aware of any deafness or tinnitus, but examination by an otologist showed a high C (4096) deafness in the right ear. Following lumbar puncture he developed headache, and deafness and tinnitus in the right ear, all severe at first but passing away during the next week, during which time he vomited twice.

Case 2.—A man of forty-three complained that for fourteen years he had had nine or ten attacks a year of cramp-like abdominal pain, diarrhoea, burning sensation behind the sternum, vomiting, frontal headache and some giddiness. Each attack lasted for four to twenty-four hours, after which he felt well until the next one. The giddiness, which had been recounted as an unimportant symptom, was always a definite sensation that objects were rotating in an anti-clockwise direction. For the last year there had been increasing deafness and tinnitus in the right ear. The otologist found right internal ear deafness. For thirteen years the attacks of vertigo had occurred without noticeable deafness or tinnitus.

ETIOLOGY

The membranous labyrinth is a closed system consisting of (1) sacculle,

(2) Stop smoking. Allow tea in moderation only.

(3) If the above treatments alone are not successful, try courses of phenobarbitone, aspirin, bromide, or potassium iodide. The following prescription is often useful:—

Soluble phenobarbitone	$\frac{1}{2}$ grain
Aspirin	5 grains
Potassium bromide	5 grains
Syrup	20 minims
Mucilage as necessary	
Water	to 120 minims

Twice or three times a day in courses lasting a few weeks to a few months.

(4) Eliminate foci of sepsis in mouth, nose and throat where this sepsis is obviously detrimental to the patient's general health, and ensure there is no Eustachian obstruction.

The above treatments often diminish the frequency and severity of the attacks of vertigo but hearing is less likely to improve.

(5) If these measures fail, and if the attacks of vertigo are sufficiently distressing and the hearing on the affected side is sufficiently bad to justify the proceeding, it might be necessary for an otologist to destroy the function of the affected labyrinth. The expert can pass a needle through the tympanic membrane and foramen ovale into the labyrinth and inject a minute quantity of alcohol into it. After this operation tinnitus persists in a number of cases (cf. phantom limb).

(6) Before taking this last extreme measure it would be worth giving further consideration to the latest work on the vascular theories of the disease (Atkinson, 1943; Brunner, 1944).

SUMMARY

(1) A brief summary of Ménière's disease is given. The condition is a distension of the endolymph system.

(2) Cases may come to the practitioner for differential diagnosis of attacks of vertigo when there is no noticeable deafness or tinnitus.

(3) With the attacks of vertigo there may be widespread disturbance of the vegetative system, with such symptoms as abdominal pain and diarrhoea. In such cases recurrent primary gastro-intestinal disorder may occasionally be simulated.

(4) Interest at present is returning to vascular theories of the origin of the disease.

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On one occasion he fell from a railway platform on to the line. After the fall, but not before, things seemed to whirl in a horizontal direction before his eyes. He had no tinnitus, and except for slight left deafness compatible with old healed otitis media, nothing abnormal was found on examination of the ear, nose and throat, the eye and the nervous system; the electro-encephalogram was normal.

Ménière's disease is regarded by some as aural migraine. The internal auditory artery which supplies the labyrinth and the posterior cerebral artery which supplies the visual centre in the occipital lobe, are both branches of the basilar artery.

DIAGNOSIS

Vertigo, the consciousness of disordered orientation of the body in space (Russell Brain), can occur in diseases or disorders of the mind, cerebral cortex, eyes, brainstem, cerebellum, eighth nerve, middle ear, including the Eustachian tube, and external ear, e.g. wax, as well as in labyrinthitis due to spread of infection from neighbouring organs, congenital or acquired syphilis, mumps or other specific fevers. In Eustachian obstruction and wax in the external ear, associated tinnitus and deafness may cause close simulation of Ménière's disease. Such causes as anæmia, hypertension or hypotension should be borne in mind, as well as the effects of drugs such as quinine and the salicylates, and such rarities as labyrinthine bleeding in blood disorders. Giddiness on standing is common in people with vasomotor instability, and in cases of anxiety neurosis. No case of giddiness without a true sense of rotation should be regarded as labyrinthine without critical scrutiny by an otologist.

In most cases of Ménière's disease the key to the diagnosis is the *periodicity*. Occasionally there may be persistent unsteadiness between the main attacks or even persistent vomiting and nausea without distinct attacks, but in such cases tinnitus and deafness usually give the clue to the diagnosis.

If there is weakness of the face or if the corneal reflex is diminished on one side, cerebello-pontine angle tumour should be considered. Marked nystagmus between attacks of vertigo is not due to Ménière's disease. Absence of tinnitus and deafness, and persistence of vertigo and nystagmus for several days, with paresis of one external rectus, conjugate lateral deviation of the eyes, or facial paresis, would point to a lesion of the pons.

Ménière attacks with loss of consciousness or falling must be distinguished from epilepsy of the temporal lobe, in which also hallucinations of movement may occur. Audiometry or the electro-encephalogram may aid clinical diagnosis in such cases.

TREATMENT

During attacks:—Rest, lying flat. If severe, 1 to 2 c.cm. of pernocton intravenously, or $\frac{1}{2}$ grain of morphine sulphate and $\frac{1}{150}$ grain of hyoscine hydrobromide subcutaneously.

Between attacks:—(1) Reduce intake of salt and water. Encourage exercise, fresh air, and baths. If possible, correct any underlying condition causing water retention. These patients often hear more clearly and feel generally better after exercise.

suddenly seized with a convulsive fit, and becomes blind. He struggles through the attack; but again and again it returns; and before a day or a week has elapsed, worn out by convulsions or overwhelmed by coma, the painful history of his disease is closed."

Treatment.—The immediate treatment, then, is *strict rest in a warm-bed*, and this must be continued until the blood pressure has returned to normal, the œdema has disappeared, and the urine tests reveal no blood and only a trace of albumin. If these good things do not quickly occur, rest must be continued until all hope of a cure is given up. If the patient does not show these signs of recovery in two to three months he may be allowed to get up and lead a normal although somewhat restricted life for as long as possible.

The second principle of treatment is *diet*, which for the first four or five days, or a week if the patient does not complain too loudly, should consist of a pint of fruit juice per day, a few biscuits and nothing else whatsoever. On this regime, despite the fluid restriction, diuresis will nearly always occur, the œdema will disappear, and the blood pressure will subside. Further diet is dictated by progress. If there is œdema, no salt will be allowed and fluids will be restricted to 20 to 30 ounces daily. Solid food should be largely carbohydrate at this stage. When the œdema has gone and the blood pressure is normal, return to normal diet may be fairly rapid. Prolonged protein restriction has no merit and no effect on the albuminuria which may still be present in small degree. It is most important to recognize that a considerable number of patients with acute nephritis have heart failure on account of the hypertension. This is shown by orthopnœa, filling of the neck veins, tenderness of the liver and pulmonary congestion. In severe cases the treatment is venesection.

The prompt treatment of convulsions, should they occur, is also important, for they add gravity to the immediate prognosis. Venesection again is indicated, with cautious withdrawal of cerebrospinal fluid, and intravenous hypertonic sucrose (200 c.cm. of 50 per cent. solution). Hypertonic saline is contraindicated. Paraldehyde or sodium phenobarbitone are also useful.

In the great majority of cases, heart failure and convulsions *will not occur* if the case is properly treated.

PREGNANCY KIDNEY

Exactly the same principles of treatment apply to the pregnancy kidney, and here the importance of early recognition cannot be overstressed, because there is a specific treatment, namely the termination of the pregnancy. Again, the practitioner should look forward and remember that the sequelæ of this disorder are extremely grave. The young woman who now pleads to let the pregnancy proceed does not, fortunately, see herself in the future, leading a restricted and curtailed life of incurable hypertension; yet that is not uncommonly the result.

Treatment.—The following principles may form a guide. For albuminuria without hypertension: restricted activity, light diet, avoidance of cold, and

THE EARLY RECOGNITION OF DISEASE

V.—RENAL DISEASE: AND ITS TREATMENT

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ACUTE NEPHRITIS

It is comparatively rare for the early signs of acute nephritis to pass unrecognized but tragically common for their significance and importance to be unrealized. Opportunities for early treatment are thrown away and the patient is allowed, nay, even instructed, to do those things which should be forbidden. In other words, *I still see patients with acute nephritis in the out-patient department.* They have come long journeys. They have waited for buses and for trams at draughty street corners, they have taken exercise at a stage when their blood pressures are rapidly rising, they have been exposed to cold when their chief aid to recovery is a warm bed, and they have run the risk of a superimposed infection from public transport and from waiting rooms.

What usually occurs in the initial stages of nephritis? The patient, who has probably had an infection such as tonsillitis from one to three weeks previously, develops swelling of the face, the hands, and the ankles. He may notice that his urine is scanty and blood stained, and he is probably short of breath. Œdema usually ensures that his disease is properly interpreted and his urine is tested to confirm the diagnosis, but his blood pressure is rarely taken. This is a pity because a blood pressure of 180/110 mm. Hg in an adolescent or young adult is impressive, and such a level is not uncommon at this stage. His immediate dangers are convulsions, heart failure, uræmia, and infection; his remote danger is chronic nephritis and uræmia after a latent period of months or years.

Although as yet no specific remedy has been found, all students of kidney disease are agreed that the recovery rate from acute nephritis is good (over 80 per cent.), but that the chances of recovery are much improved by early and correct management. There is also general agreement that the factors which really matter in treatment are immediate confinement to a warm bed and certain dietary restrictions, which will be described shortly. There is considerable evidence that warmth increases the blood supply to the kidneys and reduces the blood pressure, and as most of these patients are either already threatened by acute heart failure, or at least run the risk of it, exercise is out of the question. Moreover, exercise means increased metabolism and offends the basic principle of rest.

Whenever a young person with acute nephritis is seen, it is well to think not of what is, but of what may be, and to re-read Richard Bright on the terminal stages of this disease:—

"... should he escape this danger likewise, other perils await him; his headaches have been observed to become more frequent; his stomach more deranged; he is

treatment, which can practically guarantee prompt relief, and the recognition that chronic pyelonephritis, which may supervene in a mismanaged case, can be a serious disease leading to chronic ill-health, hypertension and renal failure.

Treatment.—The most rapid relief of symptoms is still to be obtained by large doses of alkali—60 grains of sodium bicarbonate every two hours at first, and every four hours when the urine is alkaline. The most rapid cure, in the *B. coli* cases, is by sulphonamides. Urinary infection is the one condition in which these drugs need not be given in full doses: 1 gm. four-hourly is enough, 1 gm. t.d.s. often sufficient, since the drug is concentrated in the kidney. The two treatments may be combined, and in either event copious fluids should be prescribed (five to six pints in twenty-four hours).

RENAL TUBERCULOSIS

In no disease of the urinary tract is early recognition more important than in renal tuberculosis. Frequency of micturition, renal pain, dysuria, unexplained pyuria and hæmaturia are symptoms which it is criminal to ignore at any age, but more especially in a young person. Examination of the testes, epididymes and seminal vesicles in the male may aid the diagnosis. A thickened ureter may be felt on rectal examination; in the female this may be felt per vaginam. Cystoscopy is essential in all such cases.

Treatment is still surgical at the moment of writing, but streptomycin has possibilities, and if not streptomycin itself, some other antibiotic may soon be discovered.

THE SIGNIFICANCE OF HÆMATURIA

The previous paragraphs will have stressed one important reason why hæmaturia should never be overlooked. It seems extraordinary that such a striking symptom should ever be allowed to go unchallenged, but hæmaturia, from whatever cause, is liable to occur in a sudden burst which may not be repeated for many months. Its rapid disappearance naturally relieves the patient's mind, but should not deceive the practitioner. It is only necessary to mention carcinoma of the bladder and renal tumour as likely causes to emphasize the fact that all such cases require a thorough urological search until the cause has been fully determined.

SULPHONAMIDE ANURIA

With the widespread and careless use of sulphonamide drugs, it is fortunate that, in temperate climates, anuria occurs but rarely as a complication. It is due to precipitation of acetyl salts of the less soluble sulphonamides (sulphapyridine, sulphathiazole and sulphadiazine) in the renal tubules and pelves, and in the ureters, which in turn is usually due to negligence on the part of the practitioner in giving his instructions, or failure on the part of the

careful observation of the blood pressure. For œdema: salt restriction. For hypertension: constant rest in bed. Should the blood pressure return to normal the patient may get up for part of the day, again under careful observation. Should the hypertension return, more rest is required, and should the blood pressure continue to rise, the pregnancy should be interrupted if it is still of less than seven months' duration (since a viable child is unlikely) or if it is of more than eight months (as a viable child is then probable). In intermediate cases the decision whether to terminate the pregnancy immediately or wait a few more weeks depends upon the severity of the disease.

CHRONIC NEPHRITIS AND HYPERTENSION

It would be ridiculous to stress the importance of early recognition of uræmia in chronic kidney disease. In general, the later it is recognized the better for the patient. There is, however, a small and rare group of patients in whom chronic hypertension, with or without albuminuria, is the result of unilateral kidney disease, and some of these patients can be cured by nephrectomy, with complete restoration of normal blood pressure. Such a condition should be suspected, although it will rarely be found, in any case of hypertension in a young person, especially if there should be a history of pyelonephritis or of renal trauma, and all such patients should be subjected to a searching urological examination, in which intravenous pyelography will probably give the major evidence. It is important that this be done without undue delay, for the hypertension caused by the one kidney will in time produce changes in the other.

Even more rarely, severe hypertension of a paroxysmal type, with episodes of acute headache, vomiting, pallor, palpitation and tremor, is due to a tumour (phaeochromocytoma) of the adrenal medulla, and is curable by surgery.

URINARY INFECTIONS

It is difficult to write a short account of the early diagnosis of urinary infection, because the symptoms are very variable. The type which causes an acute cystitis, with frequency and dysuria, is easy to recognize. Hematuria may be an early sign. But in some cases there is nothing much to point to the urinary tract, and the case comes under observation as a pyrexia of unknown origin. Sometimes there is headache and vomiting severe enough to suggest meningitis; in other cases an acute onset with rigors may suggest pneumonia or some pyogenic septicæmia. In all such cases, the rapid microscopic examination of a drop of urine under a coverslip to determine the presence of polymorphs is an easy procedure far too often neglected. Should the polymorphs be found, treatment can be started while a full bacteriological report on a specimen of urine, aseptically collected, is awaited.

Early diagnosis is important for two reasons: the efficiency of modern

treatment, which can practically guarantee prompt relief, and the recognition that chronic pyelonephritis, which may supervene in a mismanaged case, can be a serious disease leading to chronic ill-health, hypertension and renal failure.

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patient's attendants to carry them out. It is a serious matter which may lead to the death of the patient, and can be prevented if sufficient fluid is being consumed, and if alkali is prescribed whenever sulphonamides are given to a febrile patient.

The first symptom is usually pain in the loin and in the course of the ureter—something very like renal colic in fact. This is followed by the difficult passage of a small quantity of dark, bloody, chocolate-coloured urine, after which there may be complete anuria. The complication may occur quite early in the treatment of a dehydrated, febrile patient. Immediate action is essential. The drug is stopped and copious fluids are administered. If urinary secretion is not re-established in twelve hours, or if severe oliguria persists after twenty-four hours, cystoscopy is performed and the renal pelvises are washed out. A number of lives have thus been saved.

PERINEPHRIC SUPPURATION

Early diagnosis of perinephric suppuration is often extremely difficult, and fortunately is not as a rule important, for surgeons are loath to operate until they are certain that pus will be found, and no great harm is done by waiting. Yet early cases may yield to penicillin, and prolongation of illness is never desirable. Usually, pyrexia of unknown origin brings the patient to medical care. Pointers to the diagnosis which are not sufficiently realized are the importance of a preceding history of boils, and the presence of rigidity in the lumbar muscles of the affected side. This sign is best elicited with the patient in the recumbent position. A hand is inserted under the loin and the patient is told to relax. Gentle pressure upwards on to the muscle elicits obvious rigidity compared with the opposite side, quite as striking as the rigidity over an inflamed appendix.

CONCLUSION

This article has dealt with the early recognition and treatment of disease. Little has been said of prevention. Acute nephritis commonly follows an infection, but it would be a counsel of perfection to keep every case of tonsillitis in bed for a month and to make daily examinations of the urine. Yet it seems that a number of cases are probably missed, perhaps because œdema and hypertension are minimal and the patient does not seek advice. Not infrequently a case of nephritis is seen in a latent or chronic stage when a history of the acute attack is lacking. But until more is known of the real cause of nephritis it is not possible to prevent this. To know the cause, a new principle in disease will probably have to be revealed, just as bacterial infection and vitamin deficiency were new principles in their day. They gave the clue not to one disease, but to many, and I hazard the guess that the clue to nephritis will do the same. Amongst the other diseases thus explained will probably be acute rheumatism, rheumatoid arthritis, and periarteritis nodosa.

REVISION CORNER

It is proposed each month to include short articles in this section, in which experts will summarize modern treatment and clinical procedures, particularly for the benefit of general practitioners who have returned from the Forces.

STERILITY

THE investigation and treatment of subfertility should no longer be in any way haphazard. Most childless couples have come to understand that a thorough examination of both partners is now necessary. At this examination various subfertility factors will gradually emerge, many of which the practitioner can deal with himself, often with complete success, without having to refer to one of the subfertility clinics. It should be remembered that most of the cases come under the following groups :—

- (1) Pelvic pathological lesions, either inflammatory or neoplastic.
- (2) The cervical factor, the nature of the cervical plug of mucus, and the reception of the inseminated spermatozoa.
- (3) The tubal factor, which may be lack of function, spasm or occlusion.
- (4) The endocrine factor on the female side with its varying effects on the reproductive function.
- (5) The male factor in its various ramifications.

Bearing these facts in mind the practitioner should then proceed to:—

The history.—This should be full and accurate. Fortunately, many cases respond to quite simple advice.

The general examination of husband and wife, when a thorough medical overhaul is carried out.

The local examination of male and female, when various subfertility factors may quickly show themselves.

Following this, the various therapeutic measures that are called for will come under these headings :—

(a) *General health*, such as the eradication of septic foci; diet, vitamins, exercise, and the psychological treatment of some forms of impotence.

(b) *Advice about coitus*, the period of maximum fertility, and the taking of the waking rectal temperature by the wife as a guide to ovulation.

(c) *Minor gynaecological adjustments*, such as the treatment of trichomonas vaginalis, of dyspareunia, or cervical erosion and cervicitis, of retro-displacement of the uterus, the giving of a glucose pre-coital vaginal douche, and so on.

(d) *General endocrine treatment* of male and female, such as thyroid, 1 grain daily for three out of four weeks each month, to both partners, or to the wife dieneestrol, 0.1 mgm., and ethisterone, 5 mgm., daily for ten to twelve days before the expected period.

(e) *The special treatment of habitual abortion* by investigation of the husband, the giving of vitamin E, of thyroid, and injections of luteinizing agents to the wife.

(f) *Various surgical procedures* may be called for, such as dilatation and curetting, shortening of the round ligaments, myomectomy, salpingostomy, or removal of ovarian cysts.

The practitioner may next consider a *Sims post-coital test*, best carried out between the ninth and fifteenth days of a twenty-eight day cycle, six to twenty-four hours after intercourse, no bath or douche being permitted before the visit. Once the technique of this test has been grasped only practice is necessary to become expert at judging the degree of cervical invasion, the proportion of surviving sperms, and the depth of penetration. If the couple need still further investigation the practitioner will at this point probably decide to call in the help of a *subfertility clinic*. Here the following investigations can be performed :—

(1) Tubal insufflation and possibly a complementary hystero-salpingogram, best carried out between the fourth and tenth days after the end of the period. These

procedures are both essentially diagnostic, although frequently they turn out to be of therapeutic value.

(2) An endometrial biopsy, which needs no anaesthetic, and is usually taken on the twenty-fourth to the twenty-sixth day of a twenty-eight day cycle, to determine the presence or absence of ovulation.

(3) A complete seminal analysis.

(4) Various more complicated procedures and treatment, such as further hormonal investigation, the giving of oestrogenic or corpus luteum or gonadotrophic hormones to the female, or of gonadotrophic or androgenic hormones to the male, the artificial insemination of the husband's semen into the cervical canal, irradiation of the pituitary or ovaries in certain cases.

This brief synopsis is intended to act only as a guide to suggested methods of procedure in the case of a childless marriage.

C. LANE-ROBERTS, C.V.O., M.S., F.R.C.S., F.R.C.O.G.

ANTE-PARTUM AND POST-PARTUM HÆMORRHAGE

ANTE-PARTUM HÆMORRHAGE

HÆMORRHAGE after the 28th week of pregnancy is due usually to (1) accidental hæmorrhage or (2) placenta prævia.

(1) *Accidental hæmorrhage*.—The bleeding is rarely due to direct trauma. Albuminuria is usually present. Fortunately the really severe type, namely, concealed or combined hæmorrhage, is infrequent. In such cases the patients are gravely ill and exhibit changes similar to those seen in "crush syndrome".

Treatment: If the bleeding is slight, then rest in bed and sedatives will suffice. Most cases under such treatment can be brought up to term. When bleeding is more severe the membranes should be ruptured. The outlook is always much happier when external bleeding is present, for this shows that the uterine muscle possesses some function and is not completely atonic, as in cases of concealed hæmorrhage. This last is a really grave emergency. When the output of urine diminishes or anuria develops, the prognosis is always serious. First, shock needs to be treated by modern methods—warmth, sedatives, plasma transfusion. Next, the aim should be to combat the atony of the uterus. For this, pitocin, 2 units half-hourly for six doses, may be helpful. When the uterus shows signs of contracting, the membranes should be ruptured. Cæsarean section, particularly when combined with hysterectomy, has the highest mortality of any treatment.

(2) *Placenta prævia*.—The old nomenclature of central, marginal, lateral has been discarded. Type 1 now refers to the placenta which is just impinging on the lower segment; type 2 corresponds to the old classification of marginal; types 3 and 4 signify a placenta which is partly or wholly (central) across the os.

No longer is the treatment of placenta prævia considered one of emergency. Professor Macafee of Belfast University has recently shown that with conservative treatment maternal and foetal mortality can be considerably reduced. All cases of placenta prævia should be treated in a hospital. A vaginal examination is condemned unless done in the operating theatre with everything prepared for the immediate performance of a Cæsarean section. A careful speculum examination will eliminate cervical conditions—erosion, polypus, carcinoma—as being the cause of the hæmorrhage. Many cases, although hæmorrhage be slight and often recurring, may be coaxed to term. Adopting such conservative treatment the high foetal mortality due to prematurity is reduced. The treatment at or near term in types 1 and 2 is rupture of the membranes; types 3 and 4 should be delivered by Cæsarean section.

Every woman with ante-partum hæmorrhage, whether due to accidental or placenta prævia bleeding, should have her blood grouped and her Hb. estimated.

POST-PARTUM HÆMORRHAGE

It is necessary to differentiate between bleeding from lacerations of the soft parts (perineum, vagina, cervix) and the placental site. If the uterus is firmly contracted,

then the hæmorrhage is due to lacerations. For the diagnosis of a tear high up in the vagina or of the cervix it is necessary to pass a speculum. These are dealt with by suture. If conditions are such that this is impossible, then the vagina should be plugged. In bleeding from a laceration of the cervix a useful emergency treatment consists in grasping the edges of the tear with a pair of swab-holding forceps. This simple procedure will stop the bleeding pending removal of the patient to hospital.

Bleeding from the placental site : (1) *Placenta within the uterus.*—After massaging the uterus, the placenta should be expressed by *squeezing* the fundus with one or, in the case of fat women, both hands. Many attempts to do this result in shock. Sometimes cord injection is successful. The cord is re-cut and 500 c.cm. (1 pint) of warm normal saline injected into the umbilical vein. An easy way of doing this is with a Higginson's enema syringe to which a small canula has been attached. Immediately after this the fundus should be squeezed. If bleeding continues or is at any time severe then manual removal will be necessary. But before inserting the hand into the uterus a final attempt under the anæsthetic should be made to express the placenta. In grave emergency, or when operation is not possible, an intravenous injection of ergometrine (0.125 mgm.) may prove life-saving.

(2) *After delivery of placenta.*—The uterus is massaged and blood clot expressed. Oxytocic drugs are now given. When bleeding is persistent these should be given intravenously. A hot intra-uterine douche (dettol 5 per cent.) will stimulate the uterus to contract. If bleeding persists the possibility of lacerations being also present must be borne in mind. Bimanual compression is indicated when hæmorrhage is severe. Careful examination of the placenta will indicate whether membranes, a cotyledon or a placenta succenturiata have been retained. If membranes have been retained and are not visible in the vagina more harm than good will result by trying to extract them. As with hæmorrhage elsewhere in the body, general restorative measures, especially blood transfusion, are essential. It is this last that has contributed so much to the reduction of post-partum mortality.

W. C. W. NIXON, M.D., F.R.C.S., F.R.C.O.G.

INDICATIONS FOR OXYGEN THERAPY

STUDY of the methods of administration of oxygen gained a great impetus during the war. Oxygen has been required both under conditions of high flying and of deep sea diving, and much has been learnt from further experiments on man of the effects of prolonged administration of oxygen and the efficacy of various suggested methods of giving it. Clinically the one clear indication for administering oxygen is asphyxia. This may result from:—

(1) Obstruction to the entry of air into the lungs by compression of the air passages by tumours of the mediastinum, laryngeal obstruction, asthma and bronchiolitis.

(2) Interference with the transfer of oxygen across the alveolar membrane by œdema or inflammatory fluid in the air sacs of the lungs. This results from pneumonia, if sufficiently extensive, and from pulmonary œdema. Another important cause is emphysema, in which the walls of the alveoli are largely lost, and insufficient oxygen passes into the arterial blood from the much diminished surface available for gaseous interchange.

(3) Tissue "asphyxia" may also be a consequence of diminished oxygen-carrying power of the blood resulting from CO poisoning, and in the later stages of severe anæmia. In these conditions there is no interference with the passage of air into the lungs or with oxygen transference across the alveolar membrane, but the amount of oxygen carried to the tissues by the blood is greatly reduced.

In practice, the most frequent indication for giving oxygen is *bronchiolitis complicating chronic bronchitis and emphysema*. This condition is recognized by severe exacerbation of symptoms of a pre-existing bronchitis with impaired air entry at the bases of the lungs, where the intercostal spaces are also indrawn on inspiration. Sputum is copious, and the temperature may be raised to about 100° F. The hands

are warm and the nails and lips cyanotic. In such cases it is found that the arterial blood, instead of being 95 per cent. saturated with oxygen, as in health, may be down to 60 per cent. saturation, or even lower. In fact, saturation as low as 33 per cent. has been seen in a patient who died a day or two later. The venous pressure, observed by Lewis's method in the veins of the neck, is not raised except when cor pulmonale complicates the picture. In such patients efficient oxygen therapy may be life-saving. The colour improves, the low blood pressure comes up, and the patient, often mentally confused and twitching, becomes more clear-headed. He may be kept in an oxygen tent for many days. Patients have been kept in oxygen tents for as long as a month. When the exacerbation of bronchiolitis has passed off, the recovery of the nearly moribund patient may be remarkable.

Bilateral broncho-pneumonia is but a short step from the bronchiolitis described above and it is, of course, also likely to respond favourably to oxygen therapy.

In *CO poisoning*, oxygen with 5 per cent. CO_2 is recommended. The higher the oxygen pressure in the blood, the more quickly is the CO eliminated, whilst the CO_2 assists in liberating oxygen from that part of the hæmoglobin which is not combined with CO.

In other conditions the administration of oxygen is an adjuvant measure rather than a main line of therapy. In asphyxia resulting from *tracheal compression*, the ventilation of the alveoli of the lungs becomes gradually more difficult, and sooner or later the alveolar oxygen falls and the patient becomes cyanotic. At this stage of asphyxia, oxygen may be of value in maintaining a high oxygen percentage in the alveolar air, in spite of a low respiratory ventilation. This is particularly valuable if the cause of the tracheal compression is removable, e.g., a retrosternal goitre.

In *heart failure* with congestion and œdema of the lungs the arterial oxygen saturation is seldom much below 85 to 90 per cent. Here, the benefits of oxygen therapy are less striking. Much more is to be expected from giving digoxin and other cardiac remedies. The same applies to *anæmia*. In the vast majority of cases there will be no need to consider oxygen therapy. Sometimes, however, when a patient is seen with a hæmoglobin of under 20 per cent., the problem is raised of how to keep the patient alive until such potent therapeutic materials as liver have taken effect; there is a considerable risk in transfusion, as, in such patients, the heart may rapidly fail with quite moderate infusions of blood. An oxygen tent may occasionally be of value in such cases.

METHODS OF ADMINISTRATION

The highly efficient methods used by healthy young men in the Services, and developed from the B.L.B. mask, are seldom applicable when oxygen is urgently needed in clinical practice. The patient is often unconscious, or at any rate unco-operative, and it is difficult to keep these masks in place. He may be fighting for breath, and in this event may refuse to have anything on his face. In such cases an oxygen tent is the only satisfactory method. It should be remembered that inspiration occupies less than half the time of the complete respiratory cycle. Nasal catheters and spectacle frames with rigid metal tubes thus lose more than half the oxygen during expiration; although oxygen may flow from the cylinders at 6 litres per minute, these devices only permit an actual addition to inspiration of 2 litres per minute. Only a moderate increase in the oxygen content of the air entering the lungs results. To give oxygen efficiently it is thus necessary to have a reservoir between the oxygen cylinder and the patient. The rubber bag of the B.L.B. mask provides this, as does also the oxygen tent. A simpler device is a bucket-like receptacle of X-ray film surrounding the face, fastened round the neck and open at the top. As oxygen is slightly heavier than air, it will lie in this bucket at a fairly high concentration. When any of the reservoir methods is used, the flow of oxygen is usually kept at about 7 litres per minute, and a flow meter is a necessary part of the equipment for giving oxygen efficiently.

NOTES AND QUERIES

Contraindications to the Use of Phenobarbitone

QUESTION.—My attention has just been drawn to the fact that in *The British Pharmaceutical Codex 1934* the following statement occurs:—"Phenobarbitone is contraindicated in arteriosclerosis, pulmonary and cardiac disease and in nephritis". I am more than surprised at this statement, as like many other practitioners I have found these conditions to be the very ones in which phenobarbitone often proves to be the best sedative. I shall be grateful if you can inform me whether or not phenobarbitone is really contraindicated in these conditions?

REPLY.—The statement quoted from *The British Pharmaceutical Codex, 1934*, is probably based on the view that detoxication and excretion of the barbiturates are likely to be diminished when hepatic function is primarily or secondarily interfered with, or when nephritis exists. With the use of the longer acting barbiturates, intoxication has to be borne in mind. The principal contraindication would therefore be in the presence of severe primary liver disease or when liver function has been impaired, for example, by chronic heart failure. The presence of nephritis, by interfering with excretion, possesses similar possibilities and is an indication for caution. As a practising physician, and with the above possibilities in mind, I agree with the view expressed by the inquirer, that there is a definite place in cardiac disease, pulmonary disease and arteriosclerosis for the judicious use of phenobarbitone.

S. J. HARTFALL, M.D., B.Sc., F.R.C.P.

The After-Effects of Radium Therapy

QUESTION.—All the literature on radium seems to deal with dosage and I am anxious to know more of the after-effects on the tissues, as I have but little experience of them. Could you kindly tell me:—(1) Does radium in large doses produce destruction of the normal tissue as well as the malignant cells in its present method of usage? (2) Does this destruction continue for long periods after removal of radium. I understand, for instance, that after X-ray therapy to malignant growth in the breast, the tumour may go on decreasing for years. Is this also true for the effect of radium on the malignant cells and normal tissue? (3) Is this in any sense due to radio-activity produced in the tissue cells? (4) I gather that following the insertion of radium needles in axillary glands a fibrosis occurs, or may occur, with the develop-

ment of a hard lump—does this occur everywhere? For instance, are after-effects in the breast, such as hardening and thickening, produced by fibrosis? Can this be mistaken for recurrence of malignant growth or vice versa? (5) How common is recurrence of the malignant growth in the same place after treatment with maximum doses of radium needles? Am I wrong in understanding that such recurrence is most unlikely? Does the radium change the characteristics of the growth if it recurs? (6) Is there any better treatment for neuritis following radium treatment in cancer of the breast than the usual aspirin compound mixtures? (7) Is a radium scar that has been practically healed for several years liable to break down again in several fresh places? If so, is this a persistence of the action of the radium?

REPLY.—(1) Massive doses of X or gamma rays will destroy all living tissues. Therapeutic doses of radiation for cancer are designed to produce the optimum effect upon the malignant cells and the minimum effect upon the normal tissues. (2) Regression of malignant tumours following irradiation certainly proceeds over a matter of some months with some types of tumour. Decrease in size of a residual mass over a period of years is due to fibrous contraction, but isolated islets of viable tumour cells may be present and give rise to recurrence later. (3) Artificial radio-activity is not induced in the tissues by the present methods of treatment, but may be so produced with the newer forms of apparatus now under construction, and will be one of the problems requiring careful investigation before very high voltage X-rays or penetrating beams of particulate radiation are applied to patients in the treatment of malignant diseases. (4) Fibrosis following irradiation may occur as part of the repair process. One of the main problems in radiotherapy for cancer is the control of the normal tissue reaction. Extensive fibrosis should be avoided. Any residual tumour mass following irradiation must always be regarded as suspect for reasons given in (2) above. (5) This question cannot be answered directly. The correct dose of radiation is the minimum dose necessary to produce complete tumour regression, not the maximum dose that the tissues can tolerate. A small dose given in the most suitable way for a particular tumour, is likely to be more effective than a large dose given without reference to the individual tumour response. Recurrent tumours following irradiation may well differ in important respects from the tumour prior to treatment. There are a number of reasons for this,

the tendency being towards increased radio-resistance. This is one of the reasons why adequate treatment designed to meet the requirements of each individual case should be delivered at the first treatment. The chances of success with subsequent treatment are never so good. (6) Pain following radium treatment, which is due to the irradiation is usually the result of an error in technique. When it does occur and does not respond to the usual palliative measures, neurosurgery or alcohol injection of nerves may be necessary. (7) Late necrosis following irradiation is usually due to bad technique and excessive damage to the normal tissues. It is not due to persistence of the action of the radium but to devitalization of the tissues, which are then particularly liable to break down following slight trauma. Such necroses should be avoided, but certain risks may sometimes be taken deliberately in the treatment of a fatal disease, provided that the site is one where necrosis can be dealt with adequately by surgery should necrosis occur.

D. W. SMITHERS, M.D., D.M.R.

Pituitary Extracts in Herpes Zoster

QUESTION.—I find that several textbooks, both English and American, recommend the use of pituitary extracts for the relief of pain in herpes

zoster. What is the rationale of this form of treatment and can you tell me if it is an effective method of treatment?

REPLY.—The injection of pituitrin for the relief of pain in herpes zoster appears to have first been described by Vandel in 1923. He has no rationale for the treatment nor does he mention any empirical basis. He records greater relief from pain and a shorter course of the disease in the cases treated with pituitrin compared with those treated by the conventional measures of that time. Subsequent papers on this treatment come chiefly from the U.S.A. but also from Great Britain. Like Vandel, none of these offers any rationale for the treatment. All acclaim it as giving relief from pain often with dramatic speed, and as shortening the duration of the symptoms and of the eruptions. It is apparently most beneficial in severe and early cases, but is not an infallible treatment. With the exception of pregnancy there are no contraindications to its use, some observers advise that the initial dose in the elderly should be $\frac{1}{2}$ c.cm. only. The injection (usually 1 c.cm.) may have to be repeated several times if pain recurs, but, as a rule, this interference becomes increasingly delayed, and the time tends to be milder.

COLIN EDWARDS, M.D., M.F.

PRACTICAL NOTES

Sodium Caprylate in the Treatment of Tinea Pedis

THE results obtained by the use of a 10 per cent. sodium caprylate ointment in a series of U.S.A. midshipmen suffering from tinea pedis are recorded by E. L. Keeney, L. Ajello, E. Lankford and L. Mary (*Bulletin of the Johns Hopkins Hospital*, December 1945, 77, 422). The formula of the ointment used was:—

Caprylic acid	10	per cent.
Sodium hydroxide	2.45	per cent.
(20 per cent. of the theoretical amount required)		
Diethylene glycol mono-ethyl ether	3	per cent.
"Carbowax (6000)"	47.5	per cent.
n-Propyl alcohol	10	per cent.
Zinc caprylate	5	per cent.
Water	52.05	per cent.
10 per cent. of the caprylic acid is left free for a final pH adjustment of 8.0		

Forty-six young men with clinical evidence of tinea pedis and laboratory confirmation of fungous infection were treated with the caprylate ointment, forty-five men similarly affected treated with ointment base alone being used as controls. The ointment was applied under, over and between the toes and to the soles of the feet

each night and removed in the morning with soap and water or with a towel. No other foot medication was employed. Cultures were taken in all cases before beginning treatment and at weekly intervals. After two weeks' treatment with caprylate ointment the cultures, which were 100 per cent. positive at the onset, were reduced to 27.5 per cent. positive; in the control group the percentage of positive slides after two weeks' treatment was 74.3 per cent. After three weeks' treatment the positive slides in the caprylate and control groups were 13.9 and 61.8 per cent. respectively. After four weeks' treatment the percentage of positive slides in the caprylate group was only 9.3 per cent. whereas in the control group the percentage of positive slides was 50.7. After five and six weeks' treatment the percentage of positive slides in the treated and control groups was 2.2 and 12.8 respectively. Inquiry revealed that the treated men had not used the ointment regularly after approximately the first two weeks; in view of this fact the results are to be particularly encouraging. The 10 per cent. sodium caprylate ointment is a very simple

inhibited the growth of *Trichophyton mentagrophytes*, and in this respect was found superior to propionate-propionic acid, 5 and 10 per cent. undecylenate-undecylenic acid, one-half and full-strength Whitfield's, 10 per cent. ammoniated mercury, 5 per cent. sulphathiazole, and 0.5 per cent. tyrothricin ointments.

Senile Pruritus

PROMISING results from the use of testosterone propionate in the treatment of senile pruritus are reported by W. L. Dobes, J. Jones, and A. G. Franks (*Journal of Clinical Endocrinology*, December 1945, 5, 412). Their report is based upon the results obtained in ten male patients, whose ages ranged from sixty-three to eighty years, and all of whom had pruritus for which no cause could be found, apart from senile degenerative changes in the skin. In every case the condition had failed to respond to prolonged treatment by other means. The oral administration of methyl testosterone, in doses of 10 mgm. three times daily, had no effect upon the pruritus, but relief was obtained from the administration of testosterone propionate, either parenterally or by inunction, the former route providing much the best results. The usual dose for injection was 10 mgm., and this was given at intervals of three to seven days, until anything up to 10 or 12 injections had been given. The inunction was given daily, an amount of ointment containing 4 mgm. of testosterone propionate usually being applied each day, until relief was obtained. As a rule, in order to prevent recurrence, an injection of testosterone propionate had to be repeated every three or four weeks. Of the ten cases recorded, seven responded favourably to this treatment, two improved, and one obtained no benefit. As testosterone propionate is contraindicated in the presence of carcinoma of the prostate, a careful examination of the prostate, to exclude malignancy, is necessary prior to instituting this form of treatment.

Ether Convulsions

THE salient points concerning ether convulsions are discussed by N. E. Lenahan and D. Elliott (*Current Researches in Anæsthesia and Analgesia*, January-February 1946, 25, 31), who point out that these convulsions are not really due to ether. They are due to a combination of two or more of the following factors: infection, pyrexia, disturbance of the acid-base balance, anæsthesia, operative trauma, duration of operation and humidity or lack of heat radiation. Occurring during deep and prolonged anæsthesia,

they are initiated by twitching of the facial muscles. The twitching rapidly spreads to the limbs and trunk, until all the muscles are involved. This generalized twitching quickly passes into clonic convulsions which may be so violent as to necessitate restraint of the patient. As a result of spasm of the vocal cords, the intercostal muscles and the diaphragm, respiration is seriously embarrassed. The convulsions usually end abruptly, and 50 per cent. of patients recover eventually. In the fatal cases death is due to circulatory failure and occurs suddenly, from a few minutes to a few hours after cessation of the convulsions. Among the prophylactic measures recommended are: (a) all dehydrated pyrexial young patients should be given a glucose-saline drip pre-operatively; (b) all new operating theatres should be air-conditioned; (c) all surgical manipulations should be as gentle as possible; (d) the depth of anæsthesia must be kept adequate for all stages of the operation. When convulsions occur, treatment is of little value. The anæsthetic must be withdrawn immediately and oxygen administered. The head of the table should be raised and the face sponged with cold water. It has been reported that convulsions can often be stopped quickly by raising the patient to a sitting position. The carotid arteries may be compressed to reduce possible congestion. Some observers have reported success from the injection of calcium gluconate. Coramine may be required to stimulate the heart, and severe laryngospasm may indicate the insertion of a tracheal catheter. Should the anæsthetist be familiar with curare, this drug may be given cautiously in doses of 1 to 3 c.cm., as it is of definite value in arresting tonic and clonic movements.

A High-Protein Diet in Pregnancy

THAT a high-protein diet is of value in pregnancy is suggested by a small investigation carried out by Ruth M. Leverton and Thelma J. McMillan (*Journal of the American Medical Association*, January 19, 1946, 130, 134). The patients were all of adequate economic status, of good health and under 33 years of age. Originally 75 women were included in the survey, but only 33 were followed to the post-partum period, and it is these thirty-three who form the basis of the study. Eleven of the women received 5 ounces of meat daily in addition to their ordinary diet—this brought their daily protein intake up from 58 gm. to 83 gm.; eleven received a daily supplement of the vitamin B complex; the remaining eleven received no supplement of any type. These three groups were all comparable in respect to

the tendency being towards increased radio-resistance. This is one of the reasons why adequate treatment designed to meet the requirements of each individual case should be delivered at the first treatment. The chances of success with subsequent treatment are never so good. (6) Pain following radium treatment, which is due to the irradiation is usually the result of an error in technique. When it does occur and does not respond to the usual palliative measures, neurosurgery or alcohol injection of nerves may be necessary. (7) Late necrosis following irradiation is usually due to bad technique and excessive damage to the normal tissues. It is not due to persistence of the action of the radium but to devitalization of the tissues, which are then particularly liable to break down following slight trauma. Such necroses should be avoided, but certain risks may sometimes be taken deliberately in the treatment of a fatal disease, provided that the site is one where necrosis can be dealt with adequately by surgery should necrosis occur.

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each night and removed in the morning with soap and water or with a towel. No other form of medication was employed. Cultures were made in all cases before beginning treatment and the at weekly intervals. After two weeks' treatment with caprylate ointment the cultures, which were 100 per cent. positive at the onset, were reduced to 27.5 per cent. positive; in the control group the percentage of positive slides after two weeks' treatment was 74.3 per cent. After three weeks' treatment the positive slides in the caprylate and control groups were 13.9 and 61.8 per cent. respectively. After four weeks' treatment the percentage of positive slides in the caprylate group was only 9.3 per cent. whereas in the control group the percentage of positive slides was 56.7. After five and six weeks' treatment the percentage of positive slides in the treated and control groups was 14.2 and 12.8 respectively. Inquiry revealed that the treated men had not used the ointment regularly after approximately the first two weeks; in view of this fact the results are stated to be particularly encouraging. The 10 per cent. sodium caprylate ointment *in vitro* completely

the number of pregnancies, stage of pregnancy, and hæmoglobin level. The supplements were given from the fifth month of pregnancy until three months after the confinement. One month prior to delivery the mothers receiving the meat supplement had an average increase of 10 per cent. in hæmoglobin and 16 per cent. in the red cell count (the initial hæmoglobin and red cell count being taken as 100 per cent.); the values for the women receiving the vitamin B supplement were 99 per cent. for hæmoglobin and 100 per cent. for red cell count, while the corresponding figures for the control group were 95 and 100 per cent. respectively. One month after delivery the meat group had an average hæmoglobin value 20 per cent. higher than before starting the meat supplement, the corresponding figure for the other two groups being 7 and 4 per cent. None of the pregnancies or deliveries were complicated. Oedema occurred in three of the vitamin B group and three of the control group, but it was not seen in the meat group. Eight of the women in the meat group nursed their infants for at least two months, compared with five of the vitamin B group and four of the control group. The authors conclude: "the results indicate that the recommendation to normal pregnant women to increase their protein intake by eating a generous serving of meat daily in addition to their self-chosen diets would be effective in increasing hæmoglobin and red cell concentration, avoiding œdema and promoting lactation".

The Role of Saliva in the Treatment of Peptic Ulcer

ALTHOUGH little is yet definitely known about its action, L. J. J. Nye (*Medical Journal of Australia*, January 26, 1946, 33, 114) suggests that saliva may play an important part in the treatment of peptic ulcer and other forms of dyspepsia. He points out that it assists in the digestion of carbohydrate by virtue of the ptyalin it contains, and that it also contains mucin which has been shown to be of value in the treatment of peptic ulcers. In addition, its neutralizing action upon gastric acidity is important, and it is possible that the lysozyme it contains plays a part in protecting the gastric mucosa against bacterial invasion. It is therefore recommended that in the treatment of peptic ulcers and other forms of dyspepsia, stress should always be laid upon adequate mastication to ensure effective admixture of saliva with the food. Alkaline lozenges, containing calcium carbonate, magnesium carbonate, sodium citrate and sugar, are recommended, not only for their neutralizing action, but also because they

stimulate the flow of a saliva rich in mucus. Such lozenges have two further advantages: they involve the use of less alkali than do alkaline powders, and they can be easily carried in the pocket.

Hogben's Test in the Diagnosis of Pregnancy

A DESCRIPTION of the technique of Hogben's test for pregnancy is given by R. Roch and A. Amoudruz (*Revue Médicale de la Suisse Romande*, February 25, 1946, 66, 117), who have used the test in a large number of cases and have found the results equal in dependability to those of the Ascheim-Zondek and the Friedmann-Brouha tests. Certain advantages are claimed for the Hogben test:—(1) The simplicity of the technique; (2) the rapidity of response, i.e., within twenty-four hours; (3) the economy of the test. The frog (*Xenopus laevis*) is moderate in price, and the same animal can be used again after a short interval. The care of the *Xenopus* is simple; it is fed a little meat or earth worms, and can be re-inoculated after eight to ten days if the test has proved negative, or after a month if positive. The technique of the test is as follows:—

A sample of urine or serum is collected from the patient (urine possesses the disadvantage that an extract must be made with alcohol or acetone, and for this reason the authors have employed serum), and at least 1 c.cm. serum, or a quantity of extract corresponding to 10 c.cm. urine, is injected into the dorsal lymphatic sac of the female *Xenopus*. In order to prevent escape of the injected fluid from the site of puncture it is well to pass through the posterior muscular mass of the leg before penetrating the lymphatic dorsal sac. Once inoculated, the animal is kept at a temperature of 22 to 26° C. in a jar, the bottom of which is fitted with wire netting for the passage of the eggs. If the test is positive, the frog lays her eggs in 10 to 18 hours, or at times twelve. The quantity of eggs varies from some dozens to several hundred, depending upon the richness in gonadotrophic serum. As on rare occasions eggs spontaneously, it is well to inoculate several animals in order to avoid possibility of error.

The Hogben test gives positive results five to six weeks after cessation of menstruation. An article on the use of the test by E. Elkann appeared in *The Practitioner*, 1938, 140, 312. This author used morning urine for injection in dosage of 1 to 2 c.cm. If the test was negative it was repeated, using the same urine sample (which was kept in a refrigerator in the meantime), from which an extract was made. The method for making the extract is described by Zondek in his work on the ovarian and anterior pituitary lobe hormones (1935).

Choline and Cystine in the Treatment of Cirrhosis of the Liver

In view of the encouraging results obtained by various investigators in the prevention of

perimental hepatic injury by the combined administration of choline and cystine, a group of twenty patients with cirrhosis of the liver and ascites was treated by the administration of these drugs in combination with a high-protein low-fat diet and brewers' yeast, a control group of fifteen patients with large livers and ascites being given the same diet and medication except for the omission of choline and cystine. The results of the investigation are recorded by J. Beams (*Journal of the American Medical Association*, January 26, 1946, 130, 190). Each patient in the treated group received 1.5 to 3 gm. choline and the same amount of cystine daily, divided into three doses, for periods of one to three months. The diet consisted approximately of 110 gm. protein (from meat, vegetables and dairy products), 50 to 70 gm. fat, and 50 gm. carbohydrate, with 30 to 45 gm. brewers' yeast, daily. Twelve of the twenty patients in the treated group showed no enlargement of the liver, and in these twelve there was no response to the therapy. Seven of the eight patients with enlargement of the liver made a good recovery from liver decompensation. Comparison of the treated group of patients with enlargement of the liver and the control group of fifteen patients with enlarged livers, however, indicated that the combination of choline and cystine with the diet and yeast had a favourable influence on the course of the cirrhosis. The striking response of the patients with large livers compared with those in whom the liver was not enlarged suggests an effective action of choline and cystine in the presence of fatty changes in the liver. The first indication of clinical improvement was the onset of diuresis about two weeks after the institution of choline and cystine; at the end of two months ascites was no longer demonstrable and the livers had decreased in size. Also after one month's treatment a definite rise in the serum albumin was present. Of the seven patients who responded to the therapy, five were enjoying good health at the time of the report.

The Treatment of Obesity

For some years benzedrine has been used in America for the treatment of obesity, on the grounds that it decreases appetite and produces greater capacity for physical exertion. It has the disadvantage, however, that it is liable to lead to insomnia and irritability. Neither of these last two effects is produced by D-amphetamine, which is a dextro-rotatory, optically active isomer of benzedrine, and L. Hawirko and P. H. Sprague (*Canadian Medical Association Journal*, January 1946, 54, 26) have investi-

gated its effect in 162 cases of obesity. The initial dose was 2.5 mgm. one hour before each meal, and when the patient's weight became stationary on this dose, the amount was gradually increased to 5 mgm. before each meal. In addition, a diet containing 1100 calories was prescribed; salt and fluid restrictions were also advised. Only 72 of the patients persevered with treatment for more than two months, and of these only six failed to lose more than 20 per cent. of the number of pounds they were overweight. The weight lost varied with the number of pounds the patient was overweight: thus those who were 100 lb. or more overweight lost 6.3 lb. per month, whilst those who were less than 50 lb. overweight lost 4.7 lb. per month. The average weight loss for the entire group was 5.5 lb. per month. Only two patients were unable to tolerate the drug: one because of nausea, and the other because of generalized pruritus.

"Smile Therapy"

"An encouraging smile and a friendly word administered together with whatever treatment is given" are, according to Private E. R. Hill (*Journal of the Royal Army Medical Corps*, January 1946, 86, 37), of incalculable value in securing the cooperation and will to recovery of patients in hospital. Writing as a nursing orderly in the R.A.M.C., the author points out that a man on reporting sick or being admitted to hospital falls out of the ranks and becomes, during the procedure of examination and admission, an individual, or, in the author's words "the patient"; once treatment is begun, however, the man becomes "one of the patients" in the ward and the particular attention he formerly received ceases. It is at this moment that the "smile therapy" should be instituted in order to switch the patient's mind to optimism and thereby to the will to recovery. In the same way as fibrous adhesions are broken down by the surgeon's manipulations, so in the subconscious psychological atmosphere can mental adhesions be broken down "by the manipulation of a friendly word and an interested, understanding attitude". The therapy calls for patience, effort and time, but when applied, success is spectacular and the soldier is restored to health and duty within the shortest possible time. Such conditions as are deemed in Army language "dodging" or "swinging the lead" are frequently due to psychological causes, and a patient's lack of will to recover lies not only with himself but also to a great extent with his surroundings during treatment.

the number of pregnancies, stage of pregnancy, and hæmoglobin level. The supplements were given from the fifth month of pregnancy until three months after the confinement. One month prior to delivery the mothers receiving the meat supplement had an average increase of 10 per cent. in hæmoglobin and 16 per cent. in the red cell count (the initial hæmoglobin and red cell count being taken as 100 per cent.); the values for the women receiving the vitamin B supplement were 99 per cent. for hæmoglobin and 100 per cent. for red cell count, while the corresponding figures for the control group were 95 and 100 per cent. respectively. One month after delivery the meat group had an average hæmoglobin value 20 per cent. higher than before starting the meat supplement, the corresponding figure for the other two groups being 7 and 4 per cent. None of the pregnancies or deliveries were complicated. Oedema occurred in three of the vitamin B group and three of the control group, but it was not seen in the meat group. Eight of the women in the meat group nursed their infants for at least two months, compared with five of the vitamin B group and four of the control group. The authors conclude: "the results indicate that the recommendation to normal pregnant women to increase their protein intake by eating a generous serving of meat daily in addition to their self-chosen diets would be effective in increasing hæmoglobin and red cell concentration, avoiding oedema and promoting lactation".

The Rôle of Saliva in the Treatment of Peptic Ulcer

ALTHOUGH little is yet definitely known about its action, L. J. J. Nye (*Medical Journal of Australia*, January 26, 1946, 33, 114) suggests that saliva may play an important part in the treatment of peptic ulcer and other forms of dyspepsia. He points out that it assists in the digestion of carbohydrate by virtue of the ptyalin it contains, and that it also contains mucin which has been shown to be of value in the treatment of peptic ulcers. In addition, its neutralizing action upon gastric acidity is important, and it is possible that the lysozyme it contains plays a part in protecting the gastric mucosa against bacterial invasion. It is therefore recommended that in the treatment of peptic ulcers and other forms of dyspepsia, stress should always be laid upon adequate mastication to ensure effective admixture of saliva with the food. Alkaline lozenges, containing calcium carbonate, magnesium carbonate, sodium citrate and sugar, are recommended, not only for their neutralizing action, but also because they

stimulate the flow of a saliva rich in mucin. Such lozenges have two further advantages: they involve the use of less alkali than do alkaline powders, and they can be easily carried in the pocket.

Hogben's Test in the Diagnosis of Pregnancy

A DESCRIPTION of the technique of Hogben's test for pregnancy is given by R. Roch and A. Amoudruz (*Revue Médicale de la Suisse Romande*, February 25, 1946, 66, 117), who have used the test in a large number of cases and have found the results equal in dependability to those of the Ascheim-Zondek and the Friedmann-Brouha tests. Certain advantages are claimed for the Hogben test:—(1) The simplicity of the technique; (2) the rapidity of response, i.e., within twenty-four hours; (3) the economy of the test. The frog (*Xenopus laevis*) is moderate in price, and the same animal can be used again after a short interval. The care of the *Xenopus* is simple; it is fed a little meat or earth worms, and can be re inoculated after eight to ten days if the test has proved negative, or after a month if positive. The technique of the test is as follows:—

A sample of urine or serum is collected from the patient (urine possesses the disadvantage that an extract must be made with alcohol or acetone, and for this reason the authors have employed serum), and at least 1 c.cm. serum or a quantity of extract corresponding to 10 c.cm. urine is injected into the dorsal lymphatic sac of the female *Xenopus*. In order to prevent escape of the injected fluid from the site of puncture it is well to pass through the posterior muscular mass of the leg before penetrating the lymphatic dorsal sac. Once inoculated, the animal is kept at a temperature of 22 to 26° C. in a jar, the bottom of which is fitted with wire netting for the passage of the eggs. If the test is positive, the frog lays her eggs in 24 to 48 hours, or at times twelve. The quantity of eggs varies from some dozens to hundreds, depending upon the richness in gonadotrophic hormone of the inoculated serum. On rare occasions the female *Xenopus* lays eggs spontaneously, it is well to inoculate several animals in order to avoid possibility of error.

The Hogben test gives positive results five to six weeks after cessation of menstruation. An article on the use of the test by E. Elkan appeared in *The Practitioner*, 1938, 140, 312. This author used morning urine for injection in dosage of 1 to 2 c.cm. If the test was negative it was repeated, using the same urine sample (which was kept in a refrigerator in the meantime), from which an extract was made. The method for making the extract is described by Zondek in his work on the ovarian and anterior pituitary lobe hormones (1935).

Choline and Cystine in the Treatment of Cirrhosis of the Liver

In view of the encouraging results obtained by various investigators in the prevention of

d Prosser Thomas (*Proc. roy. Soc. Med.*, 45, 39, 96) and in France by Charpy, of the markedly beneficial effect of high doses of kiferol on lupus, there is good reason to think that the treatment of this distressing will not for much longer present the problem it did when this monograph went to press.

Trauma in Internal Diseases. By RUDOLF A. STERN, M.D. London: William Heinemann (Medical Books) Ltd., 1945. Pp. xxiv and 575. Price 30s.

W problems in legal medicine are more troublesome than that of estimating the causal link between an injury and a subsequent internal disease. Claims are constantly made by injured workmen against employers, and by other injured persons against those who have caused the injury or against insurance companies, for compensation based on some internal complaint which is alleged to result wholly or substantially from the injury. The only evidence available to the court is medical. Sometimes this is based on long experience, on reading and sound knowledge; sometimes it is largely guesswork. This is the kind of case in which teams of medical men are most often called upon, giving flatly contradictory evidence on opposite sides, to the discredit of their profession. A large mass of literature of varying merit, dealing with various aspects of disease, has been put up, but it is widely scattered in the medical journals of many countries. Dr. Stern, of New York City, has done the valuable service of making a critical review of the whole of this literature, both experimental and clinical. Nothing of the kind seems to have been published in this country before. He has aimed at providing the reader with a series of critical case histories, mainly with exhaustive post-mortem findings, and a description of the experimental work which has either confirmed or refuted the allegation that the trauma caused the injury. The value of such a review—and this is a very good one—to the insurance practitioner is hardly to be overrated. Under the different regional headings—heart, arteries, lungs, infectious diseases, metabolic disorder, and so on—he will find guidance on practically every kind of injury-produced syndrome. The examples are chiefly taken from practice in the United States. The author has not dealt with ulcers, wounds, which rarely present difficult problems of causation; nor has he re-trodden ground that has already been adequately covered, such as the diseases of the nervous system and the joints, electrical injuries and

chronic poisoning. As a result, he has been able to keep his book within compact limits. He has appended a long bibliography subdivided according to his chapters. The usefulness of this book need not be confined to the medical profession. Lawyers with a large insurance practice and members of pensions tribunals will also find it a valuable guide.

NEW EDITIONS

IN addition to extensive revision for the incorporation of advances in medicine since the publication of the sixth edition of *A Textbook of the Practice of Medicine*, by various authors, edited by FREDERICK W. PRICE, M.D., C.M., F.R.C.P., F.R.S.E., the seventh edition (Oxford University Press, 42s.) contains a number of entirely new articles, from among which mention may be made of those on primary atypical pneumonia, penicillin, spontaneous hypoglycæmia, protruding intervertebral disc, and fibrosis of the pancreas in infants. As is natural, in view of the eminence of the editor in the field of cardiology, this textbook contains one of the most complete sections on diseases of the circulatory system to be found in a textbook of general medicine. The new edition is assured of a warm welcome from physicians, practitioners and students, among many of whom "Price's Medicine" is regarded as their "family bible".

The Vitamins in Medicine, by FRANKLIN BICKNELL, D.M., M.R.C.P., and FREDERICK PRESCOTT, M.Sc., Ph.D., A.R.I.C., M.R.C.S., in its second edition (William Heinemann (Medical Books) Ltd., 50s.) is one of the most complete works on the vitamins available. In preparing the new edition much revision has been undertaken. Knowledge of the vitamins and their value in medicine has increased rapidly since the publication of the first edition; these advances have been incorporated and a new chapter, on the essential unsaturated fatty acids and minor fat-soluble vitamins, added. The new edition is most generously illustrated and referenced.

Methods of Treatment, by LOGAN CLENDENING, M.D., and EDWARD H. HASHINGER, A.B., M.D., in its eighth edition (Henry Kimpton, 50s.) has been enriched by the inclusion of a number of new subjects, among which are the Kenny treatment of poliomyelitis, the surgical treatment of hypertension, the use of venoms in the treatment of intractable pain, and new drugs, including sulphonamides and penicillin. The work is too well known to call for detailed mention, but the new edition is a worthy successor to its predecessors.

REVIEWS OF BOOKS

Neurosis and the Mental Health Services.

By C. P. BLACKER, M.D., F.R.C.P. With a Foreword by SIR WILSON JAMESON, K.C.B., M.D., LL.D., F.R.C.P. Oxford University Press, 1946. Pp. xxii and 218. Price 21s.

DR. BLACKER'S survey of the neurosis facilities in this country is a model of the objective way in which such an analysis should be carried out. His investigations have ranged over the whole field and they have brought to light a mass of factual information previously unknown. Thus he draws attention to the wide diversity between psychiatric clinics in different parts of the country; for instance, in London the number of doctor-sessions per million was 26.7, whilst in the Midlands it was only 6.17. An interesting survey of the psychiatric problems in industry is given, although Dr. Blacker emphasizes the difficulties of obtaining factual information. Industrial medicine is itself growing and changing rapidly; medical supervision is not uniform and records are differently kept in different factories. Nearly all the industrial medical officers agreed that local facilities for psychiatric treatment could be improved. Perhaps the most valuable viewpoint is Dr. Blacker's concept that preventive psychiatry is largely a sociological question, on which the following factors have a bearing: better nutrition, housing and town planning, better general education with the early detection of mental defect; better industrial, occupational and social psychiatry, including vocational guidance. The longest section of the report is devoted to the mental health services required by a population of a million. Dr. Blacker suggests that 100 beds per million population should be provided which should be outside mental hospitals, preferably attached to teaching hospitals. Child guidance clinics should be established by Education Authorities at the rate of one for every 20,000 children, with a hostel for about 50 unstable or difficult children. It is apparent that the supply of psychiatrists and ancillary workers is markedly deficient, so that an extensive educational policy will have to be undertaken in the coming years. Many will welcome the following sentiments and the excellent way in which they are expressed:—

"Statistics, weekly and monthly returns, and forms requiring completion are widely regarded as the weapons with which the bureaucrat wages war on the clinician. Among the forebodings to which the prospect of a state medical service gives rise is the picture of an official hierarchy which demands placation, not by the maintenance of high clinical standards, but by the meticulous discharge of clerical duties. Behind a smoke-screen of punctually returned and correctly filled-in forms, medi-

ocrity is visualized as entrenching itself. The fact is some times lost sight of that a good clerical service is indispensable for efficiency."

The Oxford University Press always maintain a high standard of work, and despite wartime restrictions the present volume lives up to the excellent standard set by the author.

The Sulphonamides in Theory and Practice.

By J. STEWART LAWRENCE, M.D., M.R.C.P.

London: H. K. Lewis & Co. Ltd., 1946.

Pp. vii and 125. Illustrated. Price 9s.

THIS review of the position which the sulphonamides have come to occupy in medical practice is timely, brief, readable and critical. From the vast literature available, the author has selected 323 references with which to illustrate his points, and these are often supplemented by accounts of his own experiences. The theoretical side is summarized in three chapters which deal with chemical structure, pharmacology and bacteriology. The practical aspect is described in relation to regions, to surgery and toxic effects. Two short, but most instructive, chapters, which draw attention to the common abuses of the sulphonamides and discuss the choice between the sulphonamides and penicillin, could be read and noted with profit by the whole profession. The author has been wise enough to include a comprehensive index. This not only makes the book useful to the busy man who wishes information on a single point, but it also reveals in how many conditions the sulphonamides have been given a trial by an experimentally minded profession.

The Problem of Lupus Vulgaris. By ROBERT

AITKEN, M.D., F.R.C.P. ED., F.R.S.E. Edinburgh: E. & S. Livingstone Ltd., 1946.

Pp. xiii and 69. Illustrations 31, including 14 in colour. Price 15s.

IN this well-produced little book, Dr. Aitken discusses, on the basis of thirty years' experience, the clinical features, methods of treatment, and social and economic aspects of lupus. He describes the technique of ultra-violet irradiation, with particular reference to the Finsen-Lomholt lamp. To obtain the best results with light therapy at least five attendances a week for a prolonged period are necessary. There is an erroneous reference (p. 3) to lupus pernio, a variety of Boeck's sarcoid, as an uncommon form of lupus vulgaris; surprisingly also, the author considers the Wassermann test of little value in differentiating lupus from a tertiary lesion as it is generally negative in tertiary syphilis. With the recent discovery, made independently in this country by Dowling

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THE SPASTIC COLON

By C. ALLAN BIRCH, M.D., F.R.C.P.

Physician, Chase Farm Hospital, Enfield.

SINCE the colon is a muscular tube it is reasonable to expect that it may sometimes become spastic or tonically contracted. Evidence that this state does occur is most usually provided by X-ray examination after a barium meal or enema. It has been observed directly at laparotomy when the colon or parts of it have been seen to be stiff and rigid. On clinical examination a hard, cord-like colon is often tender and easily palpable.

When the nerve supply of the colon is considered for an explanation of spasticity, difficulty arises, for even to-day the mechanism of nervous control of the large bowel is uncertain. The colon is supplied by parasympathetic fibres which provide the "drive", increase the rate and intensity of peristalsis, and stimulate mucus secretion, and by the sympathetic fibres, which are the "brake" and have the opposite effect.

It has long been known, however, that section of all the sympathetic fibres to the bowel of an animal is without obvious effect on the activity of the gut. This does not mean, of course, that the sympathetic has no function, but simply that it is not essential for ordinary bowel activity which can be maintained by the intrinsic nerves in the gut wall. The effects of section of the vagal supply to the bowel are somewhat obscure, but stimulation and vagomimetic drugs, such as carbachol, produce well-marked contraction and secretion of mucus. In man, the usual stimulus to vagal activity is distension, but impulses from the higher centres are also responsible, particularly in the condition under discussion. There is ample evidence that tonic contraction of a hollow viscus like the colon causes pain.

The clinical features of the spastic colon were described as long ago as 1830 by John Howship. Since then it has been discussed in numerous articles, and many names have been given to the syndrome of which the spastic colon is part, e.g. chronic colospasm, irritable colon, unstable colon, mucous colitis, spastic colitis, muco-membranous colic. Minor degrees are labelled "colon consciousness".

SYMPTOMS

These vary greatly in severity. Most patients suffering from spastic colon develop the initial symptoms before the age of forty, and complain of abdominal pain without obvious bowel symptoms, beyond constipation.

NOTES AND PREPARATIONS

THE BRITISH PHARMACEUTICAL CODEX, 1934: SUPPLEMENTS I—VII

THE issue of supplements I to VII to the British Pharmaceutical Codex, 1934, in a single bound volume will be greatly appreciated. Ready reference is facilitated by the indication of each supplement in the cut margin, and a cumulative index completes the volume. The publishers are the Pharmaceutical Press, 17 Bloomsbury Square, London, W.C.1, from whom copies can be obtained, price 21s.

HANOVIA TREATMENT RECORD CARDS

SPECIALLY prepared cards which on the one side provide for the medical history of the patient, the treatment prescribed, the progress during treatment and follow-up, and on the other side for records of the treatments given, dosage, distance and reactions, have been issued by Hanovia Ltd., Slough, Bucks, and are available price 6s. for 50, £2 14s. 9d. for 500, and £4 9s. 6d. per 1000.

"BASIC SHAPES" FOR CHILDREN'S SHOES

THE manufacturers of six well-known types of children's footwear (Start-Rite, Birthday Clark's, Kiltie, Two-Steps, Phat-Feet) have launched a new range of children's shoe lasts, which are designed to provide that the last "grows" in the same way as the child's foot develops. In an article on the "Problem of Footwear", by NORMAN C. LAKE, M.D., M.S., D.Sc., F.R.C.S., in *The Practitioner*, February 1946, 156, 81, the importance was stressed of the correct shape of the shoe as well as the correct size. In the shoes produced on "Basic Shape" lasts there is just enough increase in each size to ensure room for toe movement, both vertical and lateral, the extra growth room being across the tread of the shoe at the outside border, and gradually sloping from the tread up to the toe. As the new lasts are shorter in the waist and longer from ball to toe than the old ones, there is extra length in the forepart, and the top of the growth-graded last has been tapered so that the shoe built on the last has a heel shape curved higher and closer to the foot. There is also increased toe spring so that shoes built on the last have no toe curve, thus allowing for the foot in action and also lessening toe wear. The concentration on the close fit of the heel and the change in shape from size to size as the child's foot slenderizes during development should do much to prevent foot deformities. In the evolu-

tion of the Basic Shape lasts thousands of children's feet have been examined, and the investigations have shown that 90 per cent. of children's feet can be fitted correctly in the range of shoes with four fittings to each size, whilst 10 per cent. require special shoes.

X-RAY APPARATUS AND OPTICAL EQUIPMENT

THE Metropolitan-Vickers Electrical Co. Ltd. have acquired a substantial interest in the old established business of Newton & Wright Ltd. the well-known manufacturers of X-ray apparatus and optical equipment. Although the will be the closest cooperation between the organizations of the two companies, the firm of Newton & Wright will remain a separate entity, and all the present Directors will remain on the Board.

OFFICIAL NOTICES

National Health Service Bill. A summary of the proposed new health service has been issued by the Ministry of Health, a copy of which is obtainable from H.M. Stationery Office, price 3d. *Ascorbic Acid for Hospitals* (Circular 51/46) announces the withdrawal of circular 73/44 of June 28, 1944, as there is no longer need to restrict supplies of ascorbic acid to hospitals. *Penicillin*, issued by the Ministry of Health, refers to the packing of a part of the distributed penicillin in vials of 200,000 units, $\frac{1}{2}$ mega unit and 1 mega unit, instead of in 100,000 units vials as previously. *Scarce Substances Order*, which came into operation on April 1, 1946, rescinds all earlier Scarce Substances Orders except No. 795 (Ipecacuanha Order) which is amended by the substitution of one volume of tincture of squill and one volume of water as the authorized alternative for tincture of ipecacuanha.

PAMPHLET ON HEAD INJURIES

REPRINTS in pamphlet form of the article "Convalescence after Head Injuries: Advice for the Patient's Relations", by W. RITCHIE RUSSELL, M.D., F.R.C.P., and M. J. McANULTY, M.B., M.R.C.P., of the Radcliffe Infirmary, Oxford, appearing in this issue, can be obtained on application to the Publisher of *The Practitioner*, 5 Bentinck Street, W.1, at 6d. each, or 10 for 4s. 6d. and 50 for £1 1s. 6d., post free.

The contents for the June issue, on "Diseases of the Colon", will be found on page 151 at the end of the advertisement section.

of the bronchi and hypersecretion of mucus occur. Inflammatory changes are secondary and play no causal part, or only a minimal one, in the disease.

Hardy (1945) regards these patients as having a predisposition to overaction of plain muscle in all parts of the body, and finds that the familial and personal histories often show other psychosomatic disorders, such as asthma and peptic ulcer. Thin individuals of nervous stock and those liable to asthma and migraine form the majority of sufferers, but the syndrome may occur in patients of all constitutional types.

In most cases the use of purgatives plays a part, and even though the patient knows she is most comfortable when constipated she regards daily action of the bowel as so imperative that regular dosage is established. A painful condition of the anus, such as a fissure, may, by causing constipation and the use of purgatives, precipitate an attack in a predisposed person.

That social factors play their part in causing this state is suggested by the fact that it decreases in frequency with descent in the social scale, and seems to affect especially those whose struggle to maintain respectability and overcome the anxieties of parenthood is greatest. It also troubles spinsters whose natural desires are frustrated.

Rare causes of colonic spasm, such as lead, carbon tetrachloride, and tabes dorsalis should not be forgotten. Previous dysentery and excessive smoking are contributory causes. Allergy is put forward as a factor but has not proved convincing, unless associated with urticaria.

DIAGNOSIS

Although the history may be highly suggestive of spastic colon it must not be forgotten that organic disease may occur as often in the patient subject to psychosomatic disorders as in normal people, and the diagnosis should therefore be reached only by exclusion. If the patient is of the introspective or over-conscientious type the diagnosis is more likely to be correct. If he is an extrovert who never bothers about his bowels, then the onset of bowel symptoms is more strongly suggestive of organic disease.

The pain of spastic colon is often remarkably persistent, and a lengthy history of pain alone without other symptoms argues against serious organic disease. It must not be forgotten that there may be some underlying state, such as hyperthyroidism, requiring treatment.

In any case of bowel disorder *inspection of the stools* and a *rectal examination* are minimal requirements. Osler's definition of a consultant should never be forgotten:—"A man who makes the rectal examination after the other physicians passed it up". Rectal examination reveals nothing abnormal, in contrast to the full rectum of dyschezia or rectal constipation. The stools may be narrow and pencil-shaped or consist of small scybalous masses. Mucus may be present as previously described. When symptoms abate the stools become normal in appearance.

Sigmoidoscopy, which may be difficult to perform in these cases, reveals no abnormality.

In a small minority the passage of mucus focuses attention on the bowel.

Patients whose symptoms do not point obviously to the bowel.—These form by far the most common group. The history is usually a long one, the chief complaint being abdominal pain, mostly a mild steady ache with exacerbations. The pain tends to be worse at times of stress and tension and at the menses, but it seldom bothers the patient at night. It is aggravated by cold and relieved by warmth. The pain is mostly in the lower abdomen, but, owing to the long course of the colon and the fact that different parts of it may be in spasm, it may be felt in many areas. Hence duodenal ulcer, gall-bladder disease and appendicitis may be simulated. Although bearable in most instances, the pain may become severe enough to mimic an acute surgical condition, but there is no pyrexia, rigidity or vomiting. The absence of these features and the history of previous attacks should stay the surgeon's hand, particularly if the appendix or some other organ has already been removed.

Most of the patients are constipated and many have excess of abdominal gas. This may be difficult to pass rectally, so that it causes abdominal rumbling and distension. Pyrosis coli, a rare symptom, is a burning pain along the course of the colon. Bowel action is irregular, so that the patient is sometimes constipated and at other times has loose watery motions.

In addition to these abdominal symptoms, nervousness, depression and general exhaustion are frequent accompaniments, characteristic of the type of patient in whom spastic colon is found. Pallor, nausea, palpitation and complete exhaustion follow bowel action in some patients, and provide further evidence of instability of their vegetative nervous systems.

Patients with symptoms pointing to the bowel.—Little need be said of these patients (they were almost invariably women), for they belong to a dwindling group which has disappeared from hospital practice and is rarely seen elsewhere. In addition to the symptoms already described, they often passed mucus as a result of the excessive use of purgatives. This mucus appeared as jelly-like masses adherent to, and independent of, hard faecal lumps. Sometimes it was coagulated and passed as shreds or membranes—hence the term muco-membranous colic. Occasionally intestinal sand (calcium soap) was seen as reddish brown granules. Occult blood (if on a meat-free diet), pus and parasites were absent. Whilst gross muco-membranous colic is now rare, minor degrees are found in which at times of stress the patient becomes "belly conscious" and passes small hard faeces like sheep's droppings and pieces of mucus.

ETIOLOGY

It is generally believed that the spastic colon is essentially a psychosomatic or functional neuromuscular and neuroglandular disorder of the bowel, using the word "functional" in the sense that it is a disturbed physiological condition producing local evidence without organic change, and not in the sense that it is a psychoneurosis. It is analagous to asthma, in which spasm

TREATMENT

There are two ways of regarding patients suffering from spastic colon, as indeed there are of considering all sick people. One is, as Hippocrates taught, "to think of the patient as a whole and to learn all about him". The other is to look rather upon his disease as an entity and to seek to give it a label, irrespective of the patient to whom the label is attached. In treating the patient with a spastic colon it is important to adopt the Hippocratic attitude and consider him as a person. His treatment should be varied to suit his particular needs, since treatment on stereotyped lines is likely to fail. "Confidence and hope do more good than physic", and so it is important to reassure the patient and, in those cases in which it exists, to detect and disperse the fear of serious disease, such as cancer or ulcerative colitis. It is best to avoid the term "colitis" altogether, and if the patient asks about it, to assert dogmatically that his condition and ulcerative colitis are entirely separate diseases. Since many patients put great trust in X-rays the practitioner may be wise to show them the report, having first persuaded the radiologist to write it in reassuring terms without comment on such features as spasticity, kinks and ptosis. It is not enough to tell them there is nothing seriously wrong and to send them home, wondering, with a bottle of medicine. They must be told something definite and reassuring. As Ryle points out "examination, explanation, reassurance" should constantly be the sequence in the practitioner's mind.

The patient must be helped to adjust his life so that his colon does not ruin it. He should be told that his bowel is normal if a little sensitive. If he has peculiar beliefs about his bowels it is important to explode these. Thus he may regard his bowel as a kind of sewer to be emptied as often as possible, and think that a large fluid stool following a purge is a good thing.

A simple explanation of bowel activity is to say that yesterday's meals are entering the beginning of the large bowel this morning and will be evacuated tomorrow morning, or, more simply, that what is eaten on Saturday is evacuated on Monday. Just how much to tell the patient will be for the practitioner to decide. In general, the patient should be encouraged to be less bowel conscious and to follow Sir James Goodhart's advice to do as dogs do and never look behind. Those who poke their fæces with a stick are bad cases. The practitioner who knows his patient well will be able to help him to avoid precipitating factors and to advise him how to save his energy. A holiday may be necessary. I like to recall the recipe for longevity given by a centenarian negress who said, "When Ah sets Ah sets loose-like". These patients should emulate the negress and sit "loose-like".

Of *local measures* directed against the bowel itself, a bland diet is advisable in acute phases, together with a regular dose of one of the proprietary mucilaginous laxatives (normacol, isogel). Mineral oil may be taken, preferably in emulsion form to avoid leakage. Emulsions containing phenolphthalein should be avoided. So also should fixed inelastic diets, lest the patient become a food fad. Each patient may take what appears to suit

X-ray examination may show clear evidence of spasticity—such as extreme narrowing or the “string sign” produced by excess of mucus in a narrow spastic colon. But radiology is not infallible, since spasm may be absent at the time of examination. Its chief function in these cases is in the exclusion of more serious disease. General narrowing of the bowel and lack of haustrations resemble the findings in ulcerative colitis but are only temporary features when due to spasticity. Fuller radiological details are beyond the scope of this article.

The colon, and particularly the iliac colon, is abnormally palpable, but mere palpability is no criterion of disease since it may be found in the symptomless patient. Sometimes a ballooned and splashing cæcum is felt behind a spastic colon.

DIFFERENTIAL DIAGNOSIS

(1) *Other causes of abdominal pain, e.g. appendicitis and duodenal ulcer.*—That spastic colon is often mistaken for appendicitis is suggested by the fact that in Ryle's series (1928) 36 per cent. had had appendicectomy. When spastic colon is responsible for apparent appendicular symptoms the discomfort and tenderness are more widespread than in true appendicitis. There is usually a history of previous attacks. When “chronic appendicitis” is suggested, laparotomy should not be performed until treatment for spastic colon has failed.

Colonic pain may come on late after food and be relieved by food, thus simulating duodenal ulcer. But it does not occur rhythmically as does the pain of true duodenal ulcer. The two conditions may coexist. Modern methods of radiography should prove or exclude the presence of an ulcer.

On occasion, the diagnosis of intestinal obstruction must be seriously entertained because of the pain, distension and vomiting. This is especially so if there has been, as indeed there often has been in these cases, a previous operation. Obstruction is, in fact, present but it is of “medical” type and temporary.

(2) *Other causes of bowel symptoms.*—Diverticulitis may be suggested but here there is evidence of inflammation, and fever and leucocytosis are usually present.

Carcinoma of the colon is often the condition the patient fears and must never be excluded simply because the story sounds like that of spastic colon, particularly if the patient is over forty. Both conditions may be present with indistinguishable symptoms. If the question of carcinoma arises in the mind of the patient or the practitioner full investigation is necessary.

Ulcerative colitis can be distinguished by evidence of true inflammation in the stools, and on sigmoidoscopy.

(3) *Neurosis.*—Whilst an element of neurosis is present in many cases, this should be particularly suspected if the pain is continuous without any remissions. It should also be remembered that the significance of a pain varies inversely with the richness of its description.

TREATMENT

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DIVERTICULITIS AND DIVERTICULOSIS

BY MAURICE SHAW, D.M., F.R.C.P.

Senior Physician, West London Hospital.

It is now generally recognized that the diverticula responsible for the condition known as diverticulitis are acquired and not congenital. Routine examination of the colon by means of X-rays has clearly shown that such diverticula may be present in patients who show no other indication of abnormality in the colon, and whose symptoms are due to causes remote from that portion of the alimentary tract. To this condition—the presence of diverticula without evidence of disease of the colon—the term “diverticulosis” has been applied. It can be regarded as an inevitable antecedent to diverticulitis, although it is quite possible that diverticulitis is not its inevitable sequel. It is thought that diverticulosis may be present in as many as 1 per cent. of all persons (Rankin and Brown). In institutions where routine X-ray examinations of the alimentary canal are frequently carried out, the incidence is naturally much higher, and figures varying from 5 to 10 per cent. have been recorded. A stage preceding the actual formation of recognizable diverticula was described in 1923 by Marxer as the pre-diverticular stage, and since then both Marxer and Spriggs have claimed to have seen the various stages develop in individual patients, from the prediverticular through the stage of diverticulosis to the final stage of diverticulitis.

ETIOLOGY

Diverticula of the intestines are usually classified as false and true. The latter are distinguished by the fact that their walls are composed of the same layers as those of the intestine itself, Meckel's diverticulum being an outstanding example. The diverticula of the colon are false diverticula, inasmuch as the muscular components of the walls are usually deficient or absent. They tend to appear at weak points in the bowel wall, especially where the latter is perforated by blood vessels. They are probably of the nature of “pulsion” diverticula and increased pressure in the lumen of the intestine is doubtless one of the factors responsible for their production. There are, however, many associated factors and it is by no means easy to assess the exact etiological significance of these. The condition is far more common in men than in women. W. J. Mayo quoted a series in which 64 per cent. were men, and Spriggs found diverticulosis present in the proportion of 71 per cent. men and 29 per cent. women in a series revealed on routine X-ray examination of the bowel. This makes it unlikely that constipation has much to do with the formation of diverticula, and indeed X-ray evidence of constipation has not been found when sought. The sex incidence also rules out the use of purgatives as a possible cause, as these are

him best. These patients are better fat than lean, and frequent feeds are advisable. Rectal injections of all kinds are best avoided. Indeed, having told the patient her bowel is normal, to order colon wash-outs will immediately make her doubtful. The patient should be steered clear of the so-called "colonic laundries", which will only impoverish and make a neurotic of her. "Colitis" is indeed a useful diagnosis for the unscrupulous to suggest and treat. As Axel Munthe says in his "Story of San Michele":—"A new disease was dumped on the market, a new word was coined, a gold coin, indeed—colitis!" Short-wave diathermy to the abdomen is in the same category as colonic lavage.

Of *drugs*, belladonna is the best. It may be given in doses of 10 to 20 minims of the tincture, three times a day, combined with potassium bromide and magnesia:—

R Tincture of belladonna	..	..	..	10 minims
Potassium bromide	..	..	..	10 grains
Mixture of magnesium hydroxide	..	..	..	30 minims
Chloroform water	..	..	to	$\frac{1}{2}$ fluid ounce

or it may be more convenient as dry extract of belladonna, $\frac{1}{4}$ to $\frac{1}{2}$ a grain, in tablet form.

If side-effects, such as blurred vision and dry mouth, are troublesome, a synthetic antispasmodic, "trasentin 6H" (Ciba) 1 tablet (75 mgm.) two or three times a day, may be tried. Another useful tablet for occasional use is "spasticine" (Napp):—

R Benzyl succinate	..	..	..	0.3 gm.
Papaverine hydrochloride	..	..	..	0.03 gm.
Atropine methyl bromide	..	..	..	0.0005 gm.
One to three tablets three times a day.				

I believe a two or three months' course of a small non-hypnotic dose of a barbiturate, such as phenobarbitone $\frac{1}{4}$ to $\frac{1}{2}$ a grain, or amytal (Lilly) $\frac{3}{4}$ grain twice a day, is helpful in damping down nervous stimuli to the bowel.

RECTAL PAIN

This is included here because it seems likely that the pain is produced by spasm. It is usually an isolated symptom unassociated with those already described. It has been variously called rectal neuralgia, proctalgia fugax, paroxysmal proctalgia, and rectal crises of non-tabetic origin. It begins as a slight pain in the rectum just above the anal sphincter and works up to a maximum in five or ten minutes, to disappear in about the same time. There is no diarrhoea or passage of flatus, and rectal examination is negative. Sometimes a fainting attack complicates the picture. I have found a small warm enema and 100 mgm. of pethidine by mouth to be the best treatment.

References

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the growth of the diverticulum. The latter is relatively innocent and rarely gives rise to the inflammatory changes which are characteristic of diverticulitis. The bottle-necked variety tends to retain any faecal matter that may be pressed into it and this forms a hard faecolith which can only with difficulty be expelled into the lumen of the bowel. The retention of hard faeces in these diverticula accounts for the varied shapes that the diverticula assume when an X-ray film is taken after a barium meal or enema. The barium can only partially fill the diverticula, and the crescentic and so-called "wine glass" shadows result.

Pathologically, diverticulitis may be said to occur when an inflammatory reaction is set up around one of these diverticula as the result of the irritation and stasis of its contents. Clinically such a condition does not necessarily give rise to the symptoms and signs of diverticulitis, since a considerable area of the bowel wall must be affected before any noticeable disturbance of function results. The inflammatory reaction occurs, as would be expected, most frequently in that part of the colon where the contents are most dry and where stasis is most likely to be present, i.e., in the pelvic colon. The pathological process starts as an atrophy of the mucous membrane with a round-celled infiltration of the submucous coats. This spreads, and individual areas of inflammation coalesce until the whole wall is affected and often the mesentery as well: great thickening of the wall and mesentery results. Obstruction may occur from narrowing of the lumen, either by the swollen mucous membrane or by fibrous changes in the wall. Localized abscess formation is not uncommon and the inflamed wall becomes adherent to adjacent structures. Perforation into the peritoneal cavity hardly ever occurs, but fistulous openings between adjacent viscera are relatively frequent, vesico-colic fistulae being by far the most common. In rare cases carcinoma may develop in a diverticulum but there is no evidence that diverticulitis can be considered as a cause of carcinoma. The latter point is well illustrated by the figures given by Rankin and Brown from the Mayo Clinic: in 277 cases of diverticulitis, carcinoma was found in only four, whilst in a series of 679 cases of carcinoma, four only were found to be the subject of diverticulosis.

CLINICAL FEATURES

The mere presence of diverticula (diverticulosis) does not give rise to any recognizable symptoms and the diagnosis of this condition is only possible by X-ray examination. Diverticulitis, on the other hand, causes definite symptoms as well as objective signs, which may make a diagnosis possible without recourse to radiology.

Acute diverticulitis.—The clinical manifestations are best divided into two groups, acute and chronic. Acute diverticulitis produces a picture so similar to that of appendicitis, although usually less severe, that a separate description is hardly necessary. The two conditions can, as a rule, be readily

notoriously more used (or abused) by women than men. The condition is only found in individuals of middle or advancing age and usually of sedentary habits.

There is a general belief that adiposity is a constantly associated phenomenon and Lockhart-Mummery believed the weakness of the bowel wall which allows the diverticula to form to be due to the same metabolic causes as are responsible for the excessive deposition of fat in the subcutaneous tissues of so many middle-aged subjects. On the other hand, the statistics of the Mayo Clinic show that persons below the mean weight for their age and height are affected as frequently as those overweight. Venous stasis has been accused and, whilst there is no direct evidence that this occurs, it is a quite likely hypothesis and may be one of the many probable causative factors. Spriggs considers that the condition is a chronic inflammatory process from the outset, and draws attention to the frequent association of septic foci; he has also noted that lumbago and spondylitis, themselves possibly arising from focal sepsis, are found more frequently than can be accounted for by mere coincidence. Patterson has found microscopic changes *indicative of inflammation in the bowel wall before the stage of pouch formation*, and Spriggs believes that the radiological appearances which Marxer has described as the prediverticular stage can best be explained by incriminating an inflammatory change in the wall of the colon. Lockhart-Mummery was unable to confirm the presence of inflammation in early cases of diverticulosis in which he found small projections, no larger than a millet seed, along the longitudinal muscle bands at the points where these are perforated by vessels.

Whether the inflammatory theory is true or not it seems likely, as several writers have suggested, that hereditary predisposition plays a part. A congenital weakness of the vascular perforations of the bowel and the appendices epiploicæ, the places where the diverticula are most likely to form, would explain why the various etiological factors which have been mentioned are effective in some cases and not in others. Even normal intravisceral pressures would find out a congenitally weak point in the wall, but it would clearly take time for fully formed diverticula to develop, and thus the delay in their appearance would be accounted for.

PATHOLOGY

In the early stages the diverticula may be invisible, as the hernial protrusions are concealed by the fat which surrounds the wall of the colon. They start as exceedingly minute sacs, the walls of which are composed of the same structures as the walls of the organ from which they arise. As they increase in size the walls become thinned and the muscle fibres disappear, finally leaving only the serous and mucous coats with, perhaps, a few scattered muscle fibres between. The sac continues to increase in size but the neck or opening may remain small; in others the neck increases *pari passu* with

diverticulitis, especially when the latter leads to symptoms of chronic obstruction. Obstruction, when present, is usually of gradual onset and is due either to fibrous stricture or to inflammation of the mucosal folds. The latter yields fairly readily to treatment but the scirrhus form of stricture is not so amenable, although improvement may follow the therapeutic measures described below.

DIAGNOSIS

The diagnosis of both diverticulosis and chronic diverticulitis is established by *X-ray examination*. When obvious surgical complications exist this may be unnecessary, but in the majority of cases a clinical suspicion becomes a certainty, as the result of radiological investigation. The barium enema is the most useful procedure and is almost universally used in the Mayo Clinic. Spriggs and Marxer have described the advantages of using a "butter milk meal" if the ordinary barium meal technique is adopted. This consists of 120 gm. of barium sulphate in 500 c.cm. of buttermilk.

The X-ray appearances vary with the stage of the disease. In the pre-diverticular stage, which is only likely to be seen on a routine examination of the colon as it does not give rise to any symptoms, the outline of the descending or pelvic colon often presents a "saw-toothed" appearance with no alteration in the lumen. The area affected is often quite limited and the normal haustration may be absent in this area; re-examination of this portion of the bowel wall at a later date may reveal an intermediate stage between the prediverticular and the stage of established diverticulosis. The serrations on the wall of the affected part of the colon become sharper and more pointed and a few small diverticula may actually be seen. There may be a slight narrowing of the lumen from spasm and the colon may be tender to palpation. Finally, the stage of diverticulosis is reached in which rounded or crescentic shadows in varying sizes up to a centimetre are seen alongside the outline of the colon, many of these being obviously attached to the bowel by a small stalk. In the absence of inflammation there may not be any narrowing of the lumen and the serrated appearance previously noticed will probably have disappeared; in this event tenderness will not be noted. A characteristic and striking finding is the retention of barium emulsion in the diverticula after evacuation, the film often revealing barium in diverticula which had previously been hidden by the coils of sigmoid colon. In the advanced stage of inflammation there may be complete obstruction to the flow of barium, but before this occurs it may be possible for the radiologist to demonstrate inflammatory oedema of the mucosal folds.

Until recently it was not considered that *sigmoidoscopy* could contribute much to the diagnosis of diverticulitis, but quite a number of writers have now reported a fair degree of success. Although actual visualization of the mouths of the diverticula is not easy, the oedema of the mucosa mentioned above may be confirmed, and thickening and immobility of the wall of the

distinguished by the fact that the localization of the pain and tenderness is different; in diverticulitis it is almost invariably on the left side. Pain, tenderness and muscular rigidity situated in the left iliac fossa and associated with a raised temperature, leucocytosis, constipation, and sometimes vomiting, are the characteristic features of diverticulitis in its acute form. Localized abscess formation sometimes occurs and, particularly in women, the precise diagnosis may be uncertain before operation. The important point, however, is to recognize that it is an acute abdominal emergency requiring the same treatment, irrespective of cause. The after-treatment will be the same as the medical treatment of an ordinary case of chronic diverticulitis.

Chronic or subacute diverticulitis.—More frequently the disease manifests itself clinically in a chronic or subacute form. The symptoms which most frequently lead the patient to seek medical advice are pain and abdominal discomfort. These are both situated in the lower abdomen, and in a large majority of cases the pain is localized mainly in the left side. The symptoms vary considerably in severity. Some patients complain of little but flatulence and distension, whilst others have a great deal of pain. The latter is often intermittent and may be succeeded by periods of a week or more characterized by complete freedom. Irregular constipation and, less commonly, diarrhoea, are fairly common features of the disease. Adhesions to the bladder may cause vesical irritability with frequency of micturition; the establishment of a fistulous communication may later occur and give rise to pneumaturia or even the passage of faecal matter *per urethram*. This naturally causes a cystitis which may be followed by an infection of the rest of the urinary tract.

On examination there may be no physical signs apart from *abdominal tenderness*, which will be mainly localized to the same areas as the pain. In thin patients, and these are not the rule, it may be possible to make out a definite tumour, usually situated on the left side of the abdomen. A palpable tumour was present in 31 per cent. of the Mayo Clinic series, but the proportion will certainly depend upon the obesity of the patients. Spriggs claims that a tumour is usually palpable, except in the very obese. The tumour may vary in size and hardness from time to time and may even disappear under treatment. When an extensive inflammatory mass involving a large portion of the colon is present, the diagnosis may be exceedingly difficult by ordinary clinical methods. Splenic and renal tumours may be simulated and the final diagnosis established only by thorough investigation.

The stools are generally normal. The mucous membrane of the bowel is not involved and consequently hæmorrhage is rare. If blood is found it will usually be traced to the anal canal or other source unconnected with the presence of diverticulitis. If no other source can be found the suspicion of malignancy should certainly be entertained, but cancer is a rare complication of diverticulitis. It may, however, be difficult to distinguish cancer from

need to become more or less permanent. An enema of 3 to 6 ounces of warm olive oil or paraffin may be given and should, if possible, be retained overnight.

Regular habits as regards meals should be insisted upon, and the daily evacuation of the bowels must be religiously observed, as soon as more or less normal function is restored. Moderation in the use of alcohol and tobacco should be strictly enjoined and all necessary measures taken to maintain the general health of the patient at the highest possible level.

The results of medical treatment are extremely satisfactory. Even patients presenting symptoms of considerable severity may, by these simple measures, be restored to a tolerable measure of health. Of 37 patients thus treated at the Mayo Clinic, 34 were free from symptoms six months to seven years afterwards. The treatment applies to cases of established diverticulitis, but some of the measures described may be applied to patients in whom diverticulosis has been accidentally discovered, with a view to preventing the onset of inflammatory changes in the diverticula.

Surgical treatment should only be necessary when one or other of the following complications are present:—

- (1) Perforation
- (2) Abscess
- (3) Fistula formation
- (4) Obstruction which fails to yield to medical treatment

The surgical procedures which must be considered are colostomy and resection of the affected bowel. In acute cases complicated by abscess formation, drainage may be all that is possible at first. Later it may be necessary to undertake more extensive measures but, in some cases, this will be avoided by the application of medical treatment as outlined above. Although colostomy may sometimes be required as a permanent measure when the affected portion of bowel cannot be satisfactorily resected, it may sometimes be employed temporarily in patients in whom the condition subsequently yields to medical treatment or in whom resection has to be postponed to allow the inflammatory reaction to subside.

When radical measures are adopted it will rarely be found possible to undertake a primary resection with an end-to-end anastomosis. Surgical opinion is in favour of the Mickulicz three-stage operation in which, after a preliminary fixation of the diseased loop of bowel outside the abdomen by means of a glass rod, the affected portion of the colon is cut away with the diathermy knife and, finally, continuity restored. Of the fistulae which complicate diverticulitis the vesico-colic fistula is by far the most common. For this, colostomy must be done and restoration of the parts undertaken at a later date, if possible.

It should be borne in mind that the treatment of diverticulitis is primarily medical and that surgery should not be invoked unless some complication is present which cannot be overcome by medical means. Even in those patients

colon can be demonstrated; in some cases folds of mucosa may be adherent and frank obstruction can readily be observed. In cases in which colostomy has been performed for any reason it may sometimes be helpful to pass the instrument distally through the colostomy opening. It must, however, be realized that a great many cases with definite changes will show a perfectly normal sigmoidoscopic picture, and it should also be borne in mind that instances of perforation after such examination have been recorded.

Difficulty may sometimes be experienced in distinguishing diverticulitis from carcinoma of the colon, especially in those cases in which the main clinical feature is a progressive obstruction. In such cases sigmoidoscopy is of great help, and the combination of this method of examination with careful radiological technique will usually decide. When inflammation is present, especially with abscess formation, the possibility of a left-sided appendicitis, actinomyces or, in a woman, pyosalpinx must be considered, and it may not be possible to arrive at a correct diagnosis before operation. In the rare cases of cæcal diverticulitis the picture of appendicitis may be closely simulated.

TREATMENT

When possible, treatment should be instituted in the stage before inflammation has started. In the pre-diverticular stage and in diverticulosis the sheet anchor of treatment is liquid paraffin. This should be given in sufficient dosage to keep the bowels regular and the fæces soft, but excess should be avoided. It is best given twice a day. Saline douches may be used with discretion, but irritating purgatives should be avoided. As in the more acute stages, diet should be non-irritating, but precise diet tables are of little use while rationing of food is in operation.

In *acute cases*, provided that operative interference is not immediately called for, the treatment recommended by Rankin and Brown is to put the patient to bed and feed him on a diet containing as little residue as possible. Ice-bags are applied to the lower abdomen and rectal irrigations of hot saline are given. When the acute symptoms have subsided the diet is increased but should remain as bland and non-irritating as possible. Mineral oil is given in doses up to $\frac{1}{2}$ an ounce three times a day, as well as belladonna.

For the *ordinary chronic case* Spriggs recommends that first of all focal sepsis should be searched for and eradicated. The diet should be non-constipating. Meat should be allowed three times a week to start with, and $\frac{1}{2}$ an ounce of lactose given at breakfast. Cereals, milk and fish are allowed and, if the mucous membrane is not unduly inflamed, Spriggs prefers to give fruit, vegetables and wholemeal bread. Mineral oil is given in sufficient quantities. The *Bacillus acidophilus* is thought to be useful. Aperients should be avoided, and it is of great importance that the patient should avoid straining at stool. Saline washouts are administered every other day at a pressure of 18 inches only. Massage is not advised. In established cases, in which permanent recovery cannot be expected, lavage of the colon may

CARCINOMA OF THE COLON

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DURING the years 1935-9 there were admitted to the Royal Infirmary of Edinburgh 422 cases of carcinoma of the colon; of these, only 154 were suitable for radical surgery, representing a percentage of 37. The problem of carcinoma of the colon is thus one mainly of early diagnosis and yet this aspect is fraught with many difficulties. When the tumour is dealt with radically and is found to be "early" the expectation of a five-year cure is about 70 per cent. When radical surgery is employed in "late" cases the expectation of cure falls to about 20 per cent. To bring cases to surgery at an earlier date is the essential problem, and it is in this field that the practitioner can do so much to help. From middle age onwards any minor upset of the normal working of the bowel should be looked upon with suspicion and should call for a full investigation. Even though this may mean many "negative results" it is worth doing to find a few really early cases.

ETIOLOGY

Carcinoma of the colon commonly occurs in patients of from forty to sixty-five years of age, but on occasion the disease may be found in patients between twenty and thirty, so that youth should never rule out the possibility of the condition. The origin is at present unknown but there are certain predisposing conditions, notably the presence of polypi. These are at first benign but may later take on a malignant change. Multiple polyposis, the condition in which the whole mucous membrane of the colon is studded with small polypi, is almost invariably followed by the appearance of carcinoma. Diverticulitis may also be associated with the appearance of a tumour. Generally speaking, carcinoma of the colon is of slow growth and its spread to distant organs takes place relatively late, so that removal holds out a good chance of cure. The tumour is usually a columnar-celled carcinoma arising from the mucous membrane, but in the more rapidly growing tumours the cells are of a more primitive type, with evidence of rapid cell division. As a rule, two types of tumour occur:—

(1) The *bulky, cauliflower type of tumour*, which is usually found in the right side of the colon. It projects into the lumen of the cæcum or ascending colon and ulcerates early. Hæmorrhage occurs, and infection is also a feature. As the tumour arises from one part of the wall it does not tend to produce obstruction until a late stage. Furthermore, the contents of the cæcum and ascending colon are fluid, and therefore the obstruction must be nearly complete before symptoms arise.

(2) The *stenosing type of tumour* occurs as a small band which surrounds the intestine. There is a dense scirrhus reaction and this further leads to

in whom it is decided that operation forms part of the treatment, medical measures should not be neglected, as the latter may minimize the amount of surgical interference necessary. When obstruction complicates the disease it must be remembered that this is not necessarily due to a fibrous stricture but may be caused by a secondary swelling of the mucous membrane. Unless the obstruction calls urgently for surgical relief a thorough trial of medical treatment should be given. In a definite proportion of patients the obstruction will clear up without operation.

PROGNOSIS

The prognosis of diverticulitis is favourable, provided that treatment is instituted before the onset of any of the complications which demand the intervention of surgery. The figures previously given of the results of medical treatment at the Mayo Clinic may be taken as a fair example of what such treatment may be expected to achieve in suitable cases. Diverticulosis is itself an innocent condition but, if left alone, may lead to diverticulitis. Probably many patients with diverticulosis remain free of symptoms for the rest of their lives; a definite but unknown proportion develop diverticulitis, the incidence depending upon the various etiological factors already discussed.

The presence of a surgical complication enhances the gravity of the prognosis, for two reasons. In the first place, it is an indication that the disease has been present for some time and that the inflammatory process is fairly extensive. Secondly, there is the added, although slight, risk of the operation itself; extensive resection of the bowel in patients suffering from the effects of a septic infection, possibly complicated by a partial obstruction, is an operation with a definite mortality. Whilst perforation into the general peritoneal cavity is rare, fistula formation is relatively common and may be difficult or even impossible to deal with satisfactorily by operation. It is to be hoped that the early recognition of the disease and its adequate treatment by medical means will render the surgical complications less and less common and so make the prognosis of diverticulitis even more favourable than it is at the present time.

A full bibliography will be found in an article by Spriggs, E. I. and Marxer, O. A. (*Quart. J. Med.*, 1925, 19, 1) and in the article by Spriggs, E. I. (*Brit. Ency. med. Pract.*, 1937, 4, 205).

absorption of fluid from the fæces. The tumour may only become evident when it is felt on a routine abdominal examination. The presence of occult blood in the stools may be an important finding, as will also be a slight but persistent loss of weight. These cases will give difficulty in diagnosis in the same way as do those of a "silent" tumour of the stomach.

With tumours in the rest of the colon there is usually some interference with the normal working of the bowel and a tendency to some degree of obstruction. The normal habit of the bowel is lost and increasing doses of purgatives may be required. There may be mild attacks of abdominal pain, from time to time accompanied by borborygmi, or flatulence may be a feature. The pain may be felt mainly in the right iliac fossa, due to distension of the cæcum, and these cases may be mistaken for chronic appendicitis. When the pain is felt a little higher and flatulence is a feature it is easy to mistake the case for one of chronic cholecystitis.

When the tumour is situated low down in the pelvic colon the symptoms are usually more clear. There is the passage of blood and mucus per rectum with alternating diarrhœa and constipation. The diarrhœa tends to occur in the morning, when the bowels may move two or three times with the passage of mucus and some fæcal matter.

These symptoms are often mild and attract little attention and yet it is only by taking full note of them and having the case fully investigated that earlier diagnosis will be made. Loss of weight does not form a feature of the early case and is only of moment when it is proved over a short period by frequent weighing.

CLINICAL EXAMINATION

General examination will usually show little departure from normal. The patient may appear to be in perfect health. Abdominal examination may show the presence of visible peristalsis but this may occur only at long intervals and may not be seen at the time of the examination. A tumour may be felt in the cæcum, the ascending colon, transverse colon or the upper part of the pelvic colon, but tumours of the flexures and lower part of the pelvic colon will not be palpable. During the course of the examination the cæcum may be felt to go into spasm, becoming firm and rounded, and this will form a valuable sign of the presence of a tumour beyond this point.

Rectal examination should always be carried out, and if this is done with the patient lying on his right side it may be possible to feel a tumour of the pelvic colon through the wall of the rectum. Secondaries may also be felt on the peritoneum of the floor of the pelvis. The region of the liver should be examined for the presence of secondaries.

The next step in the investigation will be *X-ray examination* after a barium enema. In the majority of cases this examination will give all the information required, but there are fallacies. A tumour low in the pelvic colon may not be visualized, owing to the folding over on itself of the colon. For the same reason tumours at the flexures may be missed even by the

extreme narrowing of the lumen. As this type of tumour tends to occur in the transverse and left side of the colon where the contents are solid, obstruction is an early feature. As a result of the obstruction the wall of the bowel on the proximal side becomes hypertrophied and later dilated. The cæcum, being thin walled, becomes grossly distended and the stretching of its wall may give pain in the right iliac fossa. The fæces stagnate in the dilated portion and may cause ulceration of the mucous membrane with the formation of stercoral ulcers. There is excess production of mucus from the irritation, and this from time to time forms a loose stool which presents an important diagnostic symptom. The ulcers may perforate, causing a perineoplastic abscess or, if the perforation takes place into the general peritoneal cavity, a fatal form of general peritonitis. The tumour may become adherent and later spread by direct invasion to other viscera. In this way the small intestine may become involved, leading to obstruction, or a fistula may occur into the urinary bladder. Tumours of the transverse colon may thus invade the stomach. At first the tumour is situated in the mucous membrane but later it spreads through the muscular coat to the peritoneum. Once this has occurred the cells may seed to the peritoneum of the pelvic floor or to the ovaries or to the omentum, giving rise to a malignant peritonitis.

LYMPHATIC SPREAD

The right side of the colon has largely the function of absorbing the fluid part of the fæces, and in consequence the lymph drainage is free. There is, however, no clear proof that tumours in this situation do in fact spread more rapidly to the lymphatics. On the left side the lymphatic drainage is less free. The first set of lymph nodes to be affected are those close to the wall of the bowel, whilst later spread takes place to those lying along the vessels supplying the bowel. Later still, spread takes place to the para-aortic glands. The lymphatics of the ileo-colic artery drain mainly the cæcum and lower part of the ascending colon; those of the middle colic artery the upper part of the ascending colon, the hepatic flexure and the right half of the transverse colon; those of the inferior mesenteric artery the left half of the colon.

Metastases may occur in the liver, in which case the spread takes place by the portal circulation. Such an occurrence is for the most part a chance one due to some of the cells having escaped into a tributary vein. It may occur while the tumour is still in a relatively early stage or it may occur very late.

SIGNS AND SYMPTOMS

The clinical features of cancer of the colon vary considerably. With a fungating growth of the ascending colon or cæcum the main features may be those of a secondary anæmia, sometimes of profound degree. A macrocytic type of anæmia may occur which will respond well to liver treatment. There is loss of strength and increasing pallor, but a clue to the diagnosis may be afforded by some undue looseness of the bowel due to lack of

half of the transverse colon. Continuity of the intestinal tract is restored by anastomosing the small intestine to the transverse colon. This operation of right hemicolectomy is a standardized procedure and allows the removal of the lymph drainage area of this part of the colon in a most complete manner. Although seemingly a formidable procedure the mortality rate is not high and the older patient will often stand the operation in a most encouraging manner. When the whole operation at one sitting is thought to be too much for the patient, it may be carried out in two stages—the anastomosis of the terminal part of the ileum to the transverse colon being the first stage, and the removal of the colon the second. This method may also be used in cases showing some degree of obstruction.

For the remainder of the colon a more local type of removal is carried out. The affected segment of colon along with its mesentery is removed and the continuity restored by end-to-end anastomosis. Owing to the poor blood supply, healing in the colon is a slow process, and therefore some method of preventing gaseous distension of the bowel in the first few days must be used. A large diameter rubber tube may be passed from the anus up through the site of the anastomosis or a temporary cæcostomy may be made.

A safer procedure is to remove the tumour by the Paul-Mikulicz method, whereby the ends of the bowel are brought to the surface and continuity is restored at a later date, first by the application of a special clamp to crush the spur between the loops of colon, and later by closure of the colostomy which has resulted. This method will enable the affected portion to be removed along with its lymph drainage area and gets over the technical difficulties of end-to-end anastomosis; thus it is particularly applicable to the elderly patient who is a poor surgical risk.

When the patient is first seen with *acute intestinal obstruction* it must be realized that he is a very ill man, in spite of his general appearance. The bowels will often not have moved for as long as a week, and yet he may not have vomited. Such a patient will look well and yet after the simplest operative procedure his general condition is liable to deteriorate rapidly. In such cases the least possible must be done to relieve the obstruction. An accurate diagnosis of the site of the obstruction cannot always be made but some idea may be obtained from the previous history. Furthermore, carcinoma of the pelvic colon is by far the most common cause of such obstruction. Of the 422 cases of carcinoma of the colon cited, the tumour was situated in the pelvic colon in 200 and in the cæcum and ascending colon in 97. So that these two sites accounted for two-thirds of the cases.

In these cases the simplest method of overcoming the obstruction is the performance of a "blind cæcostomy". Although this will relieve the obstruction it fails to give adequate drainage of the bowel proximal to the tumour, so that the subsequent operation for removal of the tumour may be made more difficult. Furthermore, a cæcostomy requires a good deal of post-operative care to ensure that it drains satisfactorily.

most expert radiologist. A sigmoidoscopic examination should always be carried out, for it will enable a tumour in the lower part of the pelvic colon to be seen, whilst failure to pass the instrument to the pelvic colon is presumptive evidence of the presence of a tumour.

When the clinical features point clearly to a tumour of the colon and yet all the investigations are negative, it is sometimes justifiable to carry out an exploratory operation.

PROGNOSIS

After the tumour has been removed, a fairly accurate prognosis can be given from the microscopic examination of the specimen. Two methods are used: first, the classification of the type of cell forming the tumour by the method of Broders, and second, by a detailed investigation of the degree of spread of the tumour, three stages of spread being recognized. The first stage is when the cells are still confined to the wall of the bowel, the second when they have invaded the extra-mural tissues, and the third when the lymph glands have become involved. This is the method advocated by Dukes, and whilst particularly applicable to rectal tumours it has also considerable application to tumours of the colon. When the tumour is still confined to the intestinal wall the expectation of five-year cures is 62 per cent., whereas when the lymph nodes are involved the expectation of cure falls to about 30 per cent.

The naked-eye appearance of the tumour at operation may give a wrong impression, for there is a type of tumour, usually soft and bulky, which has a predilection to spread by continuity rather than by the blood or lymph streams or by the peritoneum. Such a tumour may be found invading the wall of the bladder, adjacent coils of small intestine, the abdominal wall, or another loop of the colon. The removal of the tumour may at first sight appear hardly worth while, but should be undertaken, for often the outlook is much better than might be expected. Many of the enlarged glands are found microscopically to be inflammatory and the patients will as a rule stand up remarkably well to the multiple resections required. The prognosis will often prove to be surprisingly good.

TREATMENT

At the present time operative removal of the tumour forms the only method of treatment. There is as yet no place for treatment by irradiation. In the hands of the skilled surgeon the operative mortality for all types of case should be in the region of 20 per cent. The complications that will raise this mortality figure are the presence of acute intestinal obstruction and infection in the region of the tumour, the result of lateness in the diagnosis. The surgeon's figures will only be improved by the cooperation of the family doctor in bringing these cases to operation at an earlier stage of the disease.

When the case is brought to operation *in the absence of obstruction* and the patient is fit, a single-stage removal may be carried out. In the case of tumours of the cæcum and ascending colon this consists of the removal of the last six inches of the ileum, the cæcum, ascending colon and the right

half of the transverse colon. Continuity of the intestinal tract is restored by anastomosing the small intestine to the transverse colon. This operation of right hemicolectomy is a standardized procedure and allows the removal of the lymph drainage area of this part of the colon in a most complete manner. Although seemingly a formidable procedure the mortality rate is not high and the older patient will often stand the operation in a most encouraging manner. When the whole operation at one sitting is thought to be too much for the patient, it may be carried out in two stages—the anastomosis of the terminal part of the ileum to the transverse colon being the first stage, and the removal of the colon the second. This method may also be used in cases showing some degree of obstruction.

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As it is an operation that may need to be carried out as a matter of extreme urgency by one who is not a trained abdominal surgeon, the steps of the procedure should be known.

It is wise to wash out the stomach before the operation, to prevent the risk of aspiration during the operative procedure. A local anæsthetic is injected into the field of operation, and the incision is made as for the removal of the appendix. After the abdomen has been opened the cæcum will probably extrude into the wound, and care must be taken lest it actually rupture. A portion of the cæcum is drawn into the wound and a light occlusion clamp applied. If the cæcum is so tense that this cannot be carried out, a large-bore hollow needle may be used to puncture the cæcum, and gas will escape and so make it lax. With the cæcum controlled with the clamp, an opening is made and into this is passed a large diameter rubber tube with a side hole cut in it. This is fixed in place by a catgut stitch and the wall of the cæcum is then stitched over this in the same way as in the performance of a gastrostomy. The cæcum is then returned to the abdomen and is anchored to the parietal peritoneum by two stitches. The wound is next closed around the tube and a stitch passed through the skin and through the tube to prevent it slipping out.

After the relief of the obstruction by this method the tumour is removed by a planned procedure when the patient's general condition has become restored. It is advisable to postpone the second stage for a longer rather than a shorter period, for delay usually means a steady improvement in the patient's general condition.

Although the surgery of carcinoma of the colon will give many encouragements, there will be disappointments. The successful case will show a remarkable improvement in the general health of the patient, resulting in his leading a full and active life over a period of years. He may be met ten or fifteen years later in excellent health. On the other hand, what may appear to be a small tumour of such a size that it has been diagnosed only with difficulty, may prove on microscopic examination to have spread through the wall of the intestine to involve the more distant lymph glands, resulting in the death of the patient in a short time with secondary growths in the liver or peritoneum. Yet these disappointments will have their compensations in the successful removal of the large adherent tumour with secondary involvement of coils of small intestine.

CONCLUSION

The results of surgery of carcinoma of the colon are most gratifying and are better than in any other form of malignant visceral disease. The earlier the diagnosis can be made, particularly if it be made before the onset of intestinal obstruction or any of the infective complications, the better will be the results. The disease is essentially of insidious onset and any slight alteration of the normal bowel habit in a patient of over forty years of age should be looked into. In tumours of the right half of the colon the symptoms tend rather to be constitutional, whereas in the left half the symptoms are more commonly those of intestinal obstruction. Radical surgery is worth attempting in the large adherent growth, provided there are no secondaries in the liver. These cases will often give surprisingly good results.

HIRSCHSPRUNG'S DISEASE

By WILFRID SHELDON, M.D., F.R.C.P.

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ALTHOUGH isolated instances of this disease have been reported since the seventeenth century, the first complete description was made by Hirschsprung in 1886. The condition is characterized by progressive distension, elongation, and hypertrophy of the large intestine. The great majority of patients are males. In a series of thirty cases reported by Barrington-Ward in 1928, from the records of the Hospital for Sick Children, only three occurred in girls, which gives a sex linkage even more striking than that so well known to be characteristic of hypertrophic pyloric stenosis. As a rule only one case occurs in a family. The condition should be regarded as congenital, for, although the child is born to all appearances normal, constipation begins to give trouble within the first few weeks of life, and becomes progressively more obstinate.

PATHOLOGY

The outstanding feature is the truly remarkable size of the large intestine, which is so distended that at post-mortem examination the entire abdominal contents are covered by one or two loops of the enormous bowel. As a rule the entire bowel from the cæcum to the rectum is involved, the distension being maximal in the pelvic colon. In some cases the lower end of the small intestine is also dilated. In most instances the dilatation extends down to the junction of the rectum and anal canal, but in others ends at the pelvi-rectal juncture. The anal canal is not involved. The lack of any demonstrable obstruction, either by mucosal valves or fibrous or muscular bands at the distal end of the distended bowel, is noteworthy. Almost as remarkable as the great size of the bowel is the degree of hypertrophy of its muscular walls. Both circular and longitudinal muscles are affected, but especially the circular fibres, and this gives to the bowel a pearly white colour quite distinct from that of a merely flatulent colon. The degree of muscular hypertrophy increases towards the distal end of the bowel. Not only is the girth of the colon greatly increased, but the length is also greater than the normal for the age. Prolonged stasis of the bowel contents sets up a chronic inflammation of the mucosa, and ulceration, especially in the pelvic colon, is a common finding.

ETIOLOGY

The cause of the disorder is obscure, and lack of knowledge is expressed in the alternative title of "idiopathic dilatation of the colon". Although a clinical state resembling Hirschsprung's disease occasionally arises from some demonstrable obstruction such as a rectal stricture, these are conditions distinct from Hirschsprung's disease, in which no demonstrable obstruction is present. In my view it is not correct to apply Hirschsprung's name to a syndrome characterized by a state of megacolon due in some instances to demonstrable obstruction, in others unassociated with any apparent obstruc-

tion, for Hirschsprung's original description did not cover the entire range of disorders that share megacolon as a common feature.

To account for the cases in which no demonstrable obstruction exists—cases correctly called Hirschsprung's disease—various theories have been put forward. Mechanical explanations, such as increased length of the mesentery, abnormal length of the large bowel (dolichocolon), and kinks of the colon giving rise to obstructive spurs, call attention to the results of the disease rather than its causes. Hurst regarded the condition as due to a state of achalasia, by which is meant a failure of the normal relaxation of the circular muscle which should take place as the peristaltic wave approaches. This is particularly likely to be encountered at such sphincteric levels as the cardiac sphincter at the lower end of the œsophagus, the pyloric sphincter, and the anal sphincter. Most instances of Hirschsprung's disease terminate, however, at the junction of rectum and anal canal, and a sphincter at this level has not been satisfactorily demonstrated. It has further been suggested that the state of achalasia is due to inflammatory changes taking place in Auerbach's and Meissner's plexuses, but such changes as have been described could equally well be attributed to the chronic inflammation of the mucosa and submucosa consequent upon fæcal stasis, and thus be a result of the disease. A more tenable view, and one consistent with a congenital origin, would be that there is an underlying immature and faulty neuromuscular control, that is to say, a primarily physiological rather than an anatomical defect.

SYMPTOMS

The most prominent symptom is constipation. This begins quite early in life and may actually date from birth. It is often so severe that the bowels may be opened only once a week, and at times even three or four weeks may pass without an action. Eventually the contents of the bowel putrefy, and for a few days large, loose, offensive motions are passed until the colon is empty, so that the history is likely to show long periods of constipation broken by brief spells of offensive diarrhœa. Considerable toxic absorption from the bowel takes place, growth is interfered with, the weight is much below the average, and the complexion is pale, or there may be some degree of enterogenous cyanosis. Loss of appetite and offensiveness of the breath are common, and occasionally vomiting occurs. Attacks of abdominal pain may be complained of, but are not usually severe. Examination shows the abdomen to be remarkably distended. The outline of two or three loops of the greatly enlarged colon can usually be made out through the thin abdominal wall, and can be seen undergoing slow peristaltic movements. Pressure on the inferior vena cava may cause the veins of the anterior abdominal wall to dilate, and may give rise to œdema of the legs. Rectal examination may show some ballooning of the lower bowel, but fails to reveal any obstruction. The great size of the colon and the absence of any obstruction can also be demonstrated by an X-ray taken after a barium enema.

DIAGNOSIS

There is no condition in childhood which gives so great a degree of abdominal distension, and this, combined with the history of severe con-

stipation, together with the slow massive peristaltic waves over the abdomen, can leave no doubt as to the diagnosis. Uncertainty may arise during the first few months of life, before the abdominal distension has had time to develop, but with every month that passes, any doubts will steadily be resolved.

Various conditions may simulate Hirschsprung's disease. Anal spasm in infancy, often the result of an anal fissure, may lead to persistent constipation, with eventually some abdominal distension. A rectal examination will show the presence of spasm, which is not found in Hirschsprung's disease. Digital examination will also bring to light those rare cases in which constipation from early infancy is caused by a rectal stricture, usually situated within easy reach of the finger. In one such case under my care, dilatation of the stricture by the insertion of a distensible rubber bag was attempted, but the results were unsatisfactory, and eventually a colotomy was required in order to give the child relief. The importance of a digital examination of the rectum, and if necessary a proctoscopy, in order to establish the absence of any organic obstruction, should be remembered.

Troublesome constipation, with a degree of abdominal distension, sometimes comes about as a result of redundancy in the length of the pelvic colon (dolichocolon). This is more common in girls than in boys; in contrast to the sex incidence in Hirschsprung's disease. The diagnosis may be confirmed by barium enema, when the pelvic colon can be seen to undergo one or two complete loops before ascending into the abdomen. These loops are liable to kinking, giving rise to constipation, and often accompanied by severe colicky pain. These children can often be relieved by sleeping on a tilted bed so that the hips are higher than the shoulders. This allows the pelvic colon to uncoil into the more roomy abdomen, and prevents kinking.

Lastly, mention must be made of the children who from habitual constipation collect vast amounts of hard faeces in the colon, sufficient to give large craggy masses, palpable at first in the hypogastrium, and later over most of the abdomen. Such children are very apt to lose the sensation of rectal distension, and as the distal portion of the faecal mass liquifies, so they pass it incontinently. They never reach the degree of colonic distension attained in Hirschsprung's disease, and in the latter condition faecal incontinence and the palpation of faecal masses in the abdomen are, perhaps strangely, absent.

PROGNOSIS

Probably more than half the patients die within the first two or three years from chronic toxæmia, exhaustion, and secondary infections. In Barrington-Ward's series of thirty cases, no less than fourteen died within the first year, and of these, two died within the first month. In others, a balance seems to be reached and, with care, life may be prolonged for some years, and occasionally adult life is reached. It is likely that the new drugs available for medical treatment, and the new and simpler surgical procedures of spinal anæsthesia and sympathectomy will enable many more of these children to attain adult life, but some years must elapse before this expectation can be translated into fact.

TREATMENT

The older methods of medical treatment by means of repeated enemas combined with a variety of lubricants, laxatives and purgatives, although giving temporary relief, were never able to lead to a cure, and the condition of the children tended slowly to deteriorate, and the size of the colon to increase. More recently the group of drugs that stimulate the parasympathetic nervous system have been used with much more success, e.g. acetyl- β -methylcholine chloride, pilocarpine, physostigmine and prostigmin; the last named preparation has proved particularly efficacious, and may be given in a dose of 5 mgm. three times daily, the dose being gradually increased if necessary to two or three times this amount. The beneficial effect is shown by the patient regaining a normal bowel function and passing stools once or twice a day without the aid of enemas, but the abdominal distension is not likely to show much reduction. Good results have also been reported from the use of the newer atropine derivatives, such as syntropan, which is given by mouth in doses from 5 to 25 mgm., thrice daily.

The *surgical treatment* of Hirschsprung's disease has undergone considerable modification in recent years. At a time when medical treatment was so unsatisfactory, attempts were made to cure the condition by resection of the colon. The operation was performed in two stages, beginning with an anastomosis between the lower end of the ileum and the rectum, but, however skilful the technique, colectomy carried so high a mortality that the operation has now been abandoned. The next surgical development was resection of the sympathetic nerve supply to the distal end of the large intestine. The original resection of the presacral ganglion has been condemned on the grounds that in males it is likely to abolish the power of ejaculation, rendering the patient sterile, and the most favoured operation at present is bilateral division of the 2nd to the 4th lumbar sympathetic rami. In most cases the results of operation are highly beneficial, the patient having a bowel action daily, often without the aid of laxatives. The operation does not as a rule make much impression on the distended abdominal contour.

Still more recently, comparable benefit has been found to result from *spinal anaesthesia*, so much so that the child may have his bowels open as soon as the anaesthetic takes effect. The manner in which this benefit is conferred is not understood; it has been supposed that the effect of the anaesthetic is to abolish a pre-existing imbalance between the sympathetic and parasympathetic control, and that as the child emerges from the anaesthetic these two opposing nerve influences strike a more harmonious balance. To be effective, spinal anaesthesia needs to be complete up to the 5th thoracic root. The benefit is occasionally permanent, but more often, after some weeks of improvement, the symptoms recur. In that event the anaesthetic can be repeated, but it is more usual to use spinal anaesthesia as a guide to selecting those cases that would benefit permanently from sympathectomy, and, when relapse after the anaesthetic occurs, to proceed to this operation.

ULCERATIVE COLITIS

By A. M. COOKE, D.M., F.R.C.P.

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AMONG diseases of the colon, ulcerative colitis ranks high in importance by reason of its serious nature, the difficulties of treatment, and its unknown etiology. Many diseases may sometimes cause worry to their medical attendants, but a severe case of ulcerative colitis is always a source of anxiety. Ulceration of the colon occurs in a variety of conditions, but the term ulcerative colitis or non-specific ulcerative colitis is reserved for a particular clinical entity in which, as the latter name suggests, no constant infective agent can be identified. Cases of bacillary dysentery, amœbic dysentery, gastro-intestinal infection, metazoal infestation, tuberculous ulceration, lymphogranuloma venereum, and so forth, are by definition excluded. It is true that some physicians consider that ulcerative colitis is nothing more than a variant of bacillary dysentery in which it is not possible to isolate the causative organism, but the majority of clinicians regard it as a disease *sui generis*. In the present article it is proposed to regard ulcerative colitis as a separate disease, partly because that is my belief, and partly because that is how it is presented to the clinician in practice. Ulcerative colitis may therefore be defined as an acute colitis of unknown etiology, liable to spontaneous remissions and relapses, and usually occurring in young or middle-aged subjects. It may be remarked here that so diverse are opinions on the etiology and treatment that any short article on the subject must consist largely of the writer's own personal views.

Isolated cases recognizable as ulcerative colitis were described in the literature 100 years ago. The term colitis came into use in 1860, and the first serious suggestions that ulcerative colitis should be regarded as a separate disease were made by Wilks and Moxon (1875) and Hale-White (1888), although some of the pathological appearances had been well described by Virchow in 1853.

CLINICAL FEATURES

Ulcerative colitis is a fairly common disease, and a general hospital of any size is seldom without a case in the wards. At the Radcliffe Infirmary 96 cases have been admitted during the past eight years. The sexes are about equally affected. It is essentially a disorder of young adults and the middle-aged, but cases are seen at the extremes of life. Of the Radcliffe Infirmary series 77 per cent. of the patients were between the ages of twenty and fifty years, 8 per cent. were under the age of twenty years, and 15 per cent. over the age of fifty years. It is a serious disease in childhood. Elitzak and Widerman (1941) have reported 27 cases of ulcerative colitis, mostly acute,

in children aged from two weeks upwards, with eight deaths, whilst Jackman, Bergen, and Helmholz (1940) had 23 per cent. of deaths in 95 children with chronic ulcerative colitis, as compared with 15.5 per cent. in 871 adults. Jackman (1942) has recorded several instances of more than one member of a family being affected.

The onset is fairly rapid, and by the time they are admitted to hospital cases of any severity usually have a history going back only for a matter of weeks or months. There is a fulminating variety, with a sudden onset, which may cause death in a few weeks (Jones, 1938). The less severe, chronic, and relapsing cases may have histories of up to ten or fifteen years.

The chief clinical features are diarrhœa, fever, wasting, anæmia, and sometimes vomiting. The diarrhœa occurs daily, and in the acute phase there are no periods of constipation. The patient passes a large number of stools in the day, up to 20 or more, consisting of liquid fæces, blood, pus, and mucus in variable proportions. In cases of any severity the stools always contain blood, pus, and mucus, and in severe cases there may be no fecal matter at all to be seen in the stools. In patients nearing recovery, periods of constipation may occur. There is nothing characteristic about the fever, which is usually irregular and of the order of 100° to 102°F. , and the pulse is rapid. Wasting is progressive and may be extreme, and the patients are sometimes reduced to an advanced state of cachexia. Some degree of anæmia is invariable in the active stage, and loss of blood into the bowel, added to the toxæmia which is present, may produce a rapid fall in hæmoglobin. Vomiting is an uncommon feature, but a serious one.

Complications.—The most dangerous complication is perforation of the bowel by a penetrating ulcer. Often this does not produce the classical signs of perforation and peritonitis, especially in a patient already seriously ill, but is revealed by a sudden deterioration in the patient's general condition, followed by death in twenty-four to forty-eight hours. Lesser perforations amounting only to small leaks may produce perirectal abscess or fistula. Carcinoma of the colon may arise in the later course of the disease in a small percentage of cases, and 26 examples of this complication have recently been reported by Sauer and Bergen (1944), bringing up to 50 the total number of such cases reported from the Mayo Clinic over a period of fifteen years. A number of other less common complications has been reported, such as polyarthritis, renal calculi, and nephritis. Clubbing of the fingers may occur. The polypoid swellings which occur in the mucous membrane between the ulcerated areas are often described as a complication, but are really a normal feature of the disease.

Lastly, there is the complication of nutritional deficiency, of great importance from the point of view of treatment. Any form of chronic diarrhœa is liable to interfere with intestinal absorption, partly by the rapid progress of the bowel contents and partly by coincident changes in the bowel wall, with corresponding disturbance of function. It might be supposed that as

ulcerative colitis is essentially an affection of the colon, the absorptive powers of which are in natural conditions limited to water, there would not be any disturbance of the assimilation of protein, fat, carbohydrate, salts, and vitamins. This is not the case, because large bowel diarrhœa hurries on the contents of the small intestine, and because there is reason to think that in ulcerative colitis there are not infrequently changes in the lower part of the ileum. Experimentally, defects in the absorption of glucose, dextrin, amino-acids, and vitamin A have been shown. Clinically, nutritional deficiencies are common, and were recorded in about 15 per cent. of the Radcliffe Infirmary series. In one American series, avitaminosis was said to be present in 62 per cent. of the cases. Demonstrable deficiency of vitamins A, B₁, and C, and nicotinic acid, as well as hypoproteinæmia and hypoprote thrombinæmia are seen, in addition to the usual anæmia. For some reason, frank dehydration is unusual. Perhaps the most important nutritional complication, and the most easily treated, is pellagra. If a patient with ulcerative colitis develops any skin pigmentation, roughness of the skin where it is subjected to friction or pressure, or mental changes, pellagra should at once be suspected. The diarrhœa which is often a feature of pellagra is of course masked by the diarrhœa of the primary disease, but when treatment with nicotinic acid is instituted there may be a sharp drop in the daily number of bowel actions, which shows that the diarrhœic component of pellagra was in fact present. The infantilism which has occasionally been reported in ulcerative colitis (Davidson, 1939) is largely due to nutritional factors.

Course.—The disease runs a course of months or years, remissions and relapses are common, and it is necessary to be guarded in the use of the word "cure" in relation to ulcerative colitis. Mortality rates varying from 10 to 33 per cent. have been reported in different series. In the Radcliffe Infirmary series it was 12.5 per cent., but this figure is only the mortality in hospital and not that after a follow-up period.

PATHOLOGY

The pathology of the condition may be briefly described as a severe acute colitis, which starts in the rectum and sigmoid colon and may extend for any distance up to the cæcum. The bowel is thick, œdematous, hyperæmic, and friable. Numerous small superficial ulcers are present, sometimes larger coalescing ulcers, and sometimes deep ulcers, the floors of which are formed by muscle or peritoneum. Lium and Porter (1939) have studied the distribution of the ulcers in six fatal cases and found that at the junction of the sigmoid colon and rectum the lesions tend to occur in rows over the three bands of longitudinal muscle. These findings were thought to support the view that muscular spasm plays a part in the production of the ulceration. The microscopical appearances are those of acute inflammation. Healing

occurs without sufficient scarring to produce strictures but, judging from the X-ray appearances of the bowel in apparently recovered cases, the colon never regains its original state, remaining narrowed and without the normal haustration.

DIAGNOSIS

The first step must be to confirm or disprove the diagnosis. Apart from the opinion formed on the history and the clinical features outlined above, the following investigations should always be undertaken when possible: a complete blood count, blood sedimentation rate, blood grouping, rectal examination, sigmoidoscopy, barium enema X-ray, inspection of the stools, microscopic and bacteriological examination of the stools, and estimation of the fat content of the stools. If facilities are available, a biochemical assessment of the patient's nutritional state is of interest, but in practice it is best to treat the patient as though he were in a state of nutritional deficiency.

The blood picture.—Anæmia is always present, and in a case of any severity the hæmoglobin will be down to 50 or 60 per cent. One patient in the Radcliffe Infirmary series had a hæmoglobin of under 20 per cent. The white cell count is either normal or shows a slight leucocytosis, seldom above 15,000 cells per c.mm. There is nothing characteristic about the differential white cell count. The blood sedimentation rate is always raised in the active phase, so much so that a normal figure points strongly to the bowel being healed or to the diagnosis being some disease other than ulcerative colitis. Determination of the blood group is of course a wise precaution in any anæmic or potentially anæmic patient.

Rectal examination is more often painful than not, but it may be possible to feel the abnormally smooth, thickened, "velvety" mucous membrane characteristic of the disease. It is said that actual ulcers can sometimes be felt, but this has not been my experience. *Sigmoidoscopy* is best carried out without any previous preparation except for the administration of morphine, grain $\frac{1}{3}$, half an hour before, and, if rectal examination has shown much tenderness of the anal canal, insertion of a cocaine hydrochloride suppository (grain $\frac{1}{2}$) a quarter of an hour before. Attempts to cleanse the bowel by any form of washout merely make the procedure messy and more difficult. If the patient is examined in the knee-elbow position, without inflation, and needless to say without the use of any force in the manipulation of the instrument, the procedure is safe and not difficult. The sigmoidoscopic findings are usually characteristic. The colon is less flexible than normal, the mucous membrane is hyperæmic, thickened, and granular in appearance, numerous small superficial ulcers are present, not undermined like those of chronic dysentery, sometimes larger ulcers are seen with almost polypoid thickening of the intervening mucosa, and the surface of the bowel bleeds easily when touched by the instrument. It must be emphasized that the bowel wall is often friable in ulcerative colitis, so that any attempt to

thrust the instrument in with force, or even to pass it blindly, may result in perforation, although fortunately this is a rare occurrence.

X-rays after a barium enema show changes dependent upon the stage of the disease. In the early stages the rectum and sigmoid colon appear hyper-tonic and the mucous membrane pattern is irregular. At a more advanced stage, the bowel is more rigid, smaller than normal, and of uniform diameter, haustration is diminished or absent, and sometimes ulcer craters can be seen in profile. In the later stages the colon is seen as a narrow rigid tube with no mucous membrane pattern or haustration.

Naked-eye inspection of the stools should be a routine matter in diagnosis and assessment of progress. Microscopy and bacteriological examinations are carried out in order to exclude specific infections and infestations. Estimation of the fat content is desirable in order to exclude the various forms of steatorrhœa, and it should be borne in mind that fatty stools need not necessarily be pale, bulky, and offensive, as is often stated.

Differentiation.—The most important of other diseases to be considered in differential diagnosis are carcinoma of the colon, diverticulitis, chronic dysentery, chronic intussusception, and lymphogranuloma venereum. So-called mucous colitis can be briefly dismissed. In this condition there is in fact no actual colitis. The patient passes some mucus in the stools, but no blood or pus, there is no fever, anæmia, wasting, or other evidence of constitutional disturbance, and such diarrhœa as is present alternates with constipation. The disease, if it can be so styled, is little more than constipation in a hypochondriac subject. With regard to the more serious conditions which may be confused with ulcerative colitis, it is not possible in a short article to discuss their diagnostic features at length, but careful consideration of the history, physical examination, laboratory investigations, and the X-ray and sigmoidoscopic appearances should enable a diagnosis to be reached. It may be said in general that ulcerative colitis runs true to type and that the diagnosis is not difficult.

ETIOLOGY

No single etiological factor is known, and after more than fifty years the position is still one of hypothesis, if not controversy. The appearance of the bowel on direct sigmoidoscopic inspection, on radiological examination with barium enema, and on post-mortem examination, points to acute inflammation, in many ways resembling an acute dysentery. Extensive bacteriological investigations have not revealed any constant flora, and in the majority of cases none of the ordinary pathogenic bowel organisms can be isolated. Attempts have been made to incriminate organisms too numerous to be mentioned by name, but it seems that these are present either incidentally or as secondary invaders. It may be remarked here that the occasional detection of *Entamœba histolytica* does not rule out the diagnosis of ulcerative colitis,

because this protozoon is present in the intestines of 10 per cent. of normal persons.

Psychological factors.—The well-known clinical observation that patients suffering from ulcerative colitis often show psychological disturbances, and that these features may precede the onset of physical symptoms and signs, has suggested that the patient's mental make-up, added to psychological conflicts, may be an important factor (Murray, 1930). It may be argued that every physical disease affects the patient's mental outlook and that such changes are particularly common in diseases with chronic or recurrent diarrhœa. Nevertheless, it does seem that psychological factors are more constant and more prominent in ulcerative colitis than in other forms of diarrhœa. It is certainly true that emotional disorders bear a significant relationship to relapses of ulcerative colitis. The psychological aspects have been investigated and discussed by Wittkower (1938) and Daniels (1942). Lium (1939) has made an interesting study on the etiology of the condition by direct observation of the mucous membrane of the explanted colon in dogs. He found that mechanical stimulation, parasympatheticomimetic drugs, and dysentery toxin produced spasm of the colonic muscle, which was followed by hæmorrhage and ulceration of the overlying mucous membrane, apparently mediated by a change in the character of the mucus secreted. Penner and Bernheim (1939) have produced necrosis and ulceration of the intestine in several species of animals by repeated intraperitoneal injections of adrenaline. Half of the animals developed colonic ulceration, and in rabbits and guinea-pigs the lesions were histologically similar to those found in man. Both of these sets of observations suggest a possible link between emotional disturbances and changes in the motor, secretory, and vascular state of the colon, which may produce ulceration. The suggestion that *allergy* plays a part in etiology, either as a primary or secondary factor, has not met with general acceptance. It seems probable that there is no one causative factor, and that the disease is the result of a combination of psychological factors with motor, secretory, and vasomotor disturbances of the colon, and secondary bacterial invasion.

TREATMENT

The treatment of a disease of obscure etiology must be either non-existent or empirical. In the case of ulcerative colitis, as might be expected, a large number of treatments has been suggested. In a brief survey of the literature, I have had no difficulty in finding forty different treatments which have been advocated with varying degrees of enthusiasm, and when in one textbook article are found no less than fifteen different suggestions for treatment, it is difficult to avoid the feeling that the author has not been able to make up his mind which, if any, is really effective. The therapy advocated has included diets, drugs by mouth, local applications to the bowel of a large

number of antiseptics, emollients, and astringents, the use of arsenicals, sulphonamides, and penicillin, treatment with vitamins, hormones, enzymes, and tissue extracts, vaccines, sera, and bacteriophage, artificial fever, oxygen per rectum, pneumoperitoneum, ionization, psychotherapy, blood transfusion, and a number of surgical procedures. The problem of treatment is complicated by the fact that recovery has followed all the treatments advocated, and that every treatment has had its failures. It is difficult to avoid the conclusion that there is no definitely effective single treatment or combination of treatments, and that suggestion must play a large part in the success of therapeutic measures. I have had apparently striking successes with such diverse modes of treatment as anti-dysentery serum, oxygen per rectum, sulphaguanidine, bismuth subgallate per rectum, and blood transfusion, and equally have had failures with all.

Certain *basic principles* of treatment seem to be generally accepted. The patient should be removed from the environmental influences of his home and relatives to a hospital or nursing home with a good nursing service. Skilful psychological handling by the physician and nursing staff is important. To establish the patient's confidence, will to live and belief in recovery are valuable first steps. Obvious anxiety will be diminished by a mild sedative, such as phenobarbitone, $\frac{1}{2}$ grain thrice daily.

The diet should be varied. Patients with ulcerative colitis can safely be allowed meat, poultry, game, fish, milk, eggs, cheese, small amounts of well-sieved vegetables, white bread, custards, jellies, puddings made from cereals, fruit juices, and weak tea and coffee made with milk. Condiments other than salt should be prohibited. Thorough chewing of the food is desirable. High fever, vomiting, and anorexia will of course compel a lighter diet, but the patient should be encouraged to take as generous a diet as he can manage in the circumstances. Vitamin supplements should be given, for example, adexolin, 2 capsules (or 6 minims if the patient prefers liquid to pills), aneurin, 6 mgm., ascorbic acid, 100 mgm., and nicotinic acid amide, 200 mgm., all thrice daily. It may be thought that these are generous doses, but it is best to act on the assumption that the patient is vitamin-deficient and that intestinal absorption is depressed. In any case, overdosage of vitamins to this degree is not harmful.

The hæmoglobin should be estimated weekly, and transfusions given as required to keep the hæmoglobin level above 80 per cent. Some physicians believe that fresh blood is preferable to stored blood. For recent blood loss whole blood is best, and for chronic or severe anæmia, packed cells. A guide to the amount of blood required is given by the approximation that one M.R.C. bottle of whole blood will raise the hæmoglobin by 8 per cent.

These general measures are by themselves effective in a number of cases. Additional general or local drug treatment must be left to the predilection of the individual physician.

Surgical intervention.—The surgical operations performed for the relief

of ulcerative colitis fall into three classes, ileostomy and high colostomy, which prevent the passage of fæces through the affected part of the gut; appendicostomy and cæcostomy, which are designed to permit the introduction of medicaments into the colon from above; and colectomy or hemicolectomy, which aims to remove the diseased tissue. The operative mortality is high, often 40 or even 50 per cent. These high figures are probably due to the fact that surgery is usually undertaken only in very ill patients who have failed to respond to medical treatment. It is generally agreed that appendicostomy and cæcostomy are the least useful procedures, probably because of the ineffectiveness of local applications to the colon, but they have the advantage that they are easily closed. Colectomy is a drastic procedure with a high mortality, but it does offer the prospect of cure. The most generally favoured operations are ileostomy and high colostomy. The former is extremely unpleasant for the patient because the fæces are always liquid and he never gains control of the stoma, and the loss of fluid and salts may produce biochemical disturbances, but an ileostomy does fulfil the physiological requirement of resting the colon. High colostomy is more acceptable to the patient, but there are the two risks that it may not be above the affected part of the bowel and that the disease process may later extend up to or beyond the stoma. These problems are discussed by Jones (1938). Each case must be considered on its merits, and surgery should not be undertaken lightly, but there is no doubt that operation has a place in the treatment.

Ulcerative colitis remains an interesting enigma which challenges physician, pathologist, bacteriologist, psychologist, and surgeon alike.

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CONSTIPATION

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NORMAL bowel action cannot be defined any more than can normal breathing. Every man, woman and child has his own standard, and it is only possible to say what are the limits of the normal in the varying conditions of age, sex, race, diet, activity, intelligence, civilization, excitement, depression, and so on. The result would no doubt be interesting, but would far outstrip the space allotted for this article. For the individual, and for the practitioner whose advice is sought, the important thing is to know whether or not evacuation is physiologically and emotionally satisfactory.

THE PROCESS OF DEFÆCATION

Studies of the normal or average speed of passage of food residues through the alimentary tract have their experimental value and form a basis for criteria during X-ray examination of the bowel; and the appearance of the stool, its colour, consistency, odour, bulk, and fat and bacterial content, make the basis of diagnosis for many diseases. But any great deviation from the usual serves to put the diagnosis into some other category than that of simple constipation. It will be useful to remember a few well-proved facts. The large bowel absorbs water, salt, sugar, and a few other substances of small molecular size; in general its function is that of dehydrating the liquid contents of the ileum and of storing the product until such time as the bulk is of convenient mass for expulsion. The cæcum and proximal colon are of greatest importance for dehydration, the distal colon for storage. In symptomless individuals it has great variations in length, position and capacity, so that it is necessary to be chary of speaking of ptosis, and the like. In most people the rectum and probably the whole of the sigmoid colon are empty except at the time of defæcation, when mass peristalsis urges on the partly dried contents of the transverse colon and sets up the stimulus to actual expulsion. The existence of a gastro-colic reflex (evacuation in response to gastric filling) is accepted by most physiologists, but this is absent or overlaid in many symptomless people, and hyperactive in others, who experience a desire to defæcate after each meal. Hurst gave the name of dyschezia to the condition in which fæces are retained in the rectum at most times, but it is doubtful if such a condition is abnormal, or gives rise to discomfort or more serious symptoms. Many people, following Hurst, believe that it does, but in my opinion neither retention of fæces in the rectum, nor infrequency of evacuation to the limit of many days, even perhaps two or three weeks, provoke symptoms or do ultimate harm to the individual, provided that retention is not of the extreme order that progresses

to actual impaction, and also (and this is the important point) that the individual is not convinced that they are responsible for symptoms. The rectal reflex, the stimulus to which is distension of the rectum, has in these people become hypo-active or been abolished altogether, and this constitutes a disadvantage to them, since undoubtedly life is more easy for those whose vegetative functions remain almost wholly on an unconscious level. However in civilized life, it is a counsel of perfection that defæcation shall be so conditioned that it is entirely automatic, and indeed it is easy to imagine circumstances in which it would be extremely embarrassing if it were not. A compromise is inevitable, and satisfaction must often wait on opportunity. Indefinite postponement is evil, but probably a lesser evil than either purgation or chronic defæcation anxiety. Again, the question for the practitioner to decide is whether, in a particular individual, the constipation is provocative of symptoms or is of a degree to be potentially dangerous.

Evacuation is a function of considerable emotional importance to the infant and child and, for most people, remains so in adult life; it is closely associated with sexual emotion. In healthy people it is always a mildly pleasurable sensation, and has a rather complex social significance, involving ideas of virtue and guilt, of power and submission, even of love and hate. Further, defæcation and its apparatus, the pot or W.C., are things which civilized convention, for good or ill, rules out from conversation except by way of the ribald story, thereby inducing an element of the secretive (as with sexual subjects) with a natural tendency in many individuals to private preoccupation. Finally, fears and inhibitions and actual pathological deviations are played upon by quacks, the patent medicine trade, misguided faddists, and also unfortunately by some practitioners and nurses.

THE THEORY OF TOXIC INTESTINAL STASIS

It would not be proper to dismiss this subject of "the constipation syndrome" without reference to theories of toxic absorption from intestinal stasis. These have received strong support from notable people in the history of medicine, and achieved a serious popularity in the hey-day of Arbuthnot Lane. They form the basis for the active treatment of constipation by orthodox practitioners, and for the advocacy of various "new health" regimes, including such things as starvation and bowel washouts. Headache, insomnia, lethargy, anorexia, flatulent dyspepsia, aggravation of epilepsy or migraine, and urinary infections, are some of the supposed effects. Bacteria constitute about 30 per cent. of the dried faeces, and most, if not all species found are potential pathogens, yet lumps of faeces can be swallowed by children or the insane without apparent ill-effect, and incompetence of the ileo-cæcal valve with consequent invasion of the usually sterile lower ileum, where absorption is of course active, is not necessarily or usually provocative of symptoms. It has been suggested, however, that

the products of bacteria enter the circulation through the colonic wall, when stasis is pronounced. Few of the colonic bacteria produce diffusible toxins, and it is the products of bacterial disintegration which are supposedly absorbed. Such a theory demands, and should easily receive, experimental confirmation. This is entirely lacking.

On the contrary, it has been shown that the distal colon has little or no absorptive capacity, whilst the proximal colon will absorb only substances with a small molecule. Not even the amino-acids will pass the colonic mucosa (hence the futility of nutrient enemas), still less the protein molecule. Some fermentation products, such as indole, are of a molecular size to pass the barrier; but again it has never been shown that the constipated subject has abnormally high indicanuria. It is rather in diarrhœal states that the barrier becomes, on occasion, imperfect, and gives rise to symptoms of allergy and possibly toxæmia. Lastly, there have been numerous reported cases of habitual constipation with evacuation of astounding infrequency, even up to twenty-eight days, without any symptoms of toxic absorption being manifest. In other words, when constipation is associated with the syndrome of headache, fatiguability, and anorexia, it is a fallacy to regard it as the cause; little good, and much harm, will come of treating it as such.

The practitioner, then, faced with a complaint of infrequent or inadequate evacuation, or eliciting the fact in the course of his consultation, must first decide if the sequence is abnormal for his patient, secondly, if the abnormality is an incident in a more grave condition, and thirdly, if it requires treatment. Difficult evacuation, i.e., with straining or pain, is of course always abnormal.

DIVERGENCE FROM THE NORMAL

(1) *Defæcation is found to be normal for the individual, but diverges considerably from the usual or average.*—The most striking divergences are perhaps to be seen in young children. An excitable, timid child will run to the W.C. five minutes after every meal, to produce a soft light-coloured stool; another will with difficulty be persuaded to go at all. One child's evacuation is effortless and rapid, another will spend five minutes, with obviously pleasurable effort, to produce a rugged mass, the evacuation of which to the first would have been agonizing. And these individual characteristics will probably persist through life with slight modification, if there is no interference. An alteration of habit is therefore of more importance than divergence from a hypothetical norm. But it may well happen that the patient has become aware that what for him is a normal habit, differs from the general run; or perhaps he has been told by some thoughtless person that he is abnormal. If he has sought advice, he should be treated seriously, if only to give him confidence in the assurance.

A rectal examination is a wise precaution. An extreme divergence from the

average, however habitual and symptomless, should be investigated. Dietetic fads may be discovered which are emotionally, and possibly physically, harmful. In an infant, weight records should be insisted upon to guard against underfeeding, and the feeding formula criticized. The day's programme should be considered. Children, even more than adults, need leisure for satisfactory evacuation, and the morning school rush makes the after-breakfast time (otherwise probably optimal because of the vigorous gastro-colic reflex following the night's fast) not very suitable. Many a child, however, is made constipated by the lack of reasonably good lavatory amenities at school. Children who have had any training or example in the first year or two are thereafter naturally fastidious, and will violently suppress an urgent desire rather than make use of a semi-public, soiled water closet without toilet paper, the kind of thing which is commonly seen in schools. The same factors may affect an adult in office or factory. Hirschsprung's disease and stricture of the colon should be kept in mind, as rare causes of extreme symptomless constipation.

(2) *The present habit is abnormal for the patient.*—Since the present subject is constipation, the reader must be referred elsewhere for consideration of a change from the infrequent to the frequent stool. The occasionally constipated person is more likely to consult the chemist than the doctor, but sometimes there is opportunity to advise a child's mother against the use of the occasional purge, or even the entirely purposeless prophylactic or weekend purge. Occasional constipation of one or two days, which will usually be entirely environmental or emotional in origin, is best left untreated and ignored, and this applies even in illness. The reflex is very much conditioned, and quite minor alterations in circumstance may interfere with its operation; most people, for example, experience temporary constipation when staying a night or two away from home, but any upset in the day's routine may cause a postponement which makes evacuation, without artificial stimulus, difficult or impossible until the usual hour on the following day. The purgative round of the hospital nurse is happily a thing of the past, but the practice remains in many a private household. It would be no bad thing if all the vegetable purges were put on the poisons list.

Persistent constipation, however, in a person of formerly regular habit, needs thorough investigation. A detailed history is called for, and a full examination with the patient stripped. In a child or adolescent an emotional or purely environmental cause is probable. Tuberculosis, mesenteric adenitis, and the rare chronic intussusception should be remembered. Diet alone is an unlikely cause; it is believed by some that vitamin B deficiency may contribute, but the evidence is scanty. Fatigue (mental or physical) may come into the diagnostic picture, and this may itself be the result of anæmia or even of concealed tuberculosis. In the young adult, the examination may disclose painful hæmorrhoids or fissure, even pregnancy, or the rare obstructing fibroid or other pelvic tumour. Persistent constipation

affecting an individual previously regular may be an early symptom of tumour of the spinal cord. In the middle aged, carcinoma of the colon is the most dangerous possibility, and even a negative clinical examination is not enough to eliminate this. Subacute obstruction from carcinoma of the colon is compatible with good general health for months, and the patient should be referred for X-ray examination and possibly sigmoidoscopy. In the aged, inertia and failing intellect are likely causes, but remediable fatigue states (e.g., accompanying pernicious anæmia) should be remembered. The apparent diarrhœa of the aged, with slight incontinence, is often caused by paralysis of a rectum distended by fæcal masses. At any age, hypothyroidism is a possible cause but will not, of course, be met without other characteristic features. Discussion of chronic appendicitis as a cause of constipation would be going too far afield for the limit of this article, and the practitioner must be guided by the judgement of the individual surgeon. As a physician, my personal bias lies in the direction of scepticism, in the absence of a clear history of an acute attack, and of persistent local tenderness. Careful X-ray examination will so often disclose in the symptomless person an appendix which lies in an abnormal position, is fixed or kinked or which does not fill with barium satisfactorily, that extreme care is necessary before conclusions based on X-ray evidence alone are accepted. This applies especially to the patient in whom a neurosis is suspected; operation in such people is apt to be followed by temporary relief only, and a diagnosis of "adhesions" when symptoms recur.

The abuse of purgatives.—Last, but not least, at any age constipation may be the result of purgatives. The emptying by enema of the whole colon in a normal adult, on full diet, will result in constipation for two or three days; in other words, the cæcum and transverse colon normally contain the reservoir for a three-day evacuation from the rectum. Effective purgation produces not only evacuation of the proximal colon, but even partial evacuation of the small intestine also. The expectation of a daily evacuation from purgation is the cause of increasing addiction. An example may perhaps serve to emphasize this more than exhortation:—

A medical student, having indulged rather freely at a club dinner, felt that a purge was indicated. After copious evacuation he had no bowel action for four days. He consulted the house physician, who recommended cascara, without result. The hospital registrar was called in, and increasingly powerful drugs prescribed, until, when croton oil was reached, the unfortunate man, now constipated for some ten days, consulted his chief. A brief history taking followed, and the advice was given to eat four square meals for three days, and to report if necessary. No further consultation, however, was required.

TREATMENT

How to treat simple constipation.—I am tempted to say, as the sum-total of my advice, "don't". It would perhaps be a harmless exaggeration of the undoubted truth to say that *ad hoc* treatment will defeat its own ends. Doctors

are probably much less guilty of this than chemists and patent medicine manufacturers, but there are grave temptations to follow the lead given by advertisements and eloquent manufacturers' agents. Many patients are victims of the purge habit before consulting a doctor. Purges are of three kinds—saline, vegetable, and lubricant. All have their peculiar disadvantages, and one in common, i.e., they destroy the patient's confidence in his own health, and confirm him in false conceptions of physiology. If the patient is elderly, he will probably be a life-long purgative addict, and it may be judged impossible to wean him. If so, an attempt can at least be made to reduce the damage by advising a laxative such as magnesia or a paraffin-magnesia mixture.

Diet.—Elaborate or too didactic instructions about diet are probably a mistake. If the diet contains little roughage, the residuc will be small and evacuation infrequent; the constipation here is clearly of no importance if nutritional requirements are being fulfilled. When an elderly patient is met with who earnestly desires a large bowel evacuation, but who cannot or will not eat the sort of food which would provide one, it may be useful to supply one of the colloidal preparations, such as agar, which will harmlessly increase the bulk of the stool.

It is likely that a diet which is nutritionally badly balanced, or definitely deficient, will produce constipation as part of a much more general picture of suboptimal health. Multiple causes are at work, in the direction of poor muscular and nervous tone, and the general outline of the diet is therefore well worth examination in any constipated patient, even if the gross appearance is one of reasonably good nutrition. This applies especially to children, but is also a likely factor in the preponderance of constipation in women, when blood loss from menstruation may combine with a poor diet to cause anæmia. Diet prejudices, e.g., against animal fats, may have arisen as a result of dyspepsia, which is in fact caused by a diet generally deficient, and so further contribute to ill health. For example, the mother of a family goes out to work, returns to do the household cooking and cleaning, takes the meanest share from an inadequate table, develops a gastritis, and as a consequence further restricts the variety of her food. The syndrome will be one of overwork, too little leisure and sleep, overwrought nerves, food deficiency and general ill health, with constipation as a mere detail. Laxatives and "roughage" will not help her at all.

The enema (or suppository or other form of direct bowel stimulation) is, of course, valuable in the very sick. It should not be used too freely, but only to prevent an accumulation which will create difficulties. Plain warm water is better than soap. It should never be prescribed for chronic constipation, although it may be useful to allow an occasional enema (not self-administered) to the individual who is gradually being encouraged to abandon purgatives.

THE RÔLE OF POSTURE

I feel that rather too much has been made of faulty posture as a cause of constipation. It is unlikely that we shall return to the squatting position which is unsuitable to sanitary appliances in the age of the water closet. The traveller abroad may encounter some rather remarkable water closets, in which the feet are planted on a kind of raised plaque, but they will hardly commend themselves to him; no opportunity there for a quiet five minutes with the daily newspaper! The closet should be attractive as well as hygienic; a picture or two, and a journal, good ventilation, light and warmth (and architects please note, a wash-hand basin), all contribute to make a visit pleasant and satisfactory. Children suffer from the high lavatory seat, and any child who is constipated had better use a pot. It is the wide seat, however, rather than the dangling legs which make the water closet a terror to small children, and an adjustable narrow seat, such as is provided for children with a tendency to rectal prolapse, is a good addition to any water closet in a household with children; a foot rest also can easily be improvised. (Prolapse, by the way, is not the result of constipation, but of any debilitating condition, such as an infectious disease, perhaps combined with a tendency to looseness of the bowels, rather than the reverse).

The bedpan is a frequent cause of constipation in bedridden persons. The posture is difficult, so difficult as to be an occasional cause of collapse and even of death in very feeble patients; defæcation in bed seems to the unaccustomed almost an indecency, and in hospital there is usually the added embarrassment of publicity. These things must be experienced for their gravity to be appreciated. Judicious use should be made of the bedside commode; its use by old people with heart disease will often involve less straining and therefore less risk of provoking angina or acute dilatation of the heart.

CONCLUSION

To summarize: Do not assume that infrequency of evacuation requires treatment, but examine the general life of the patient for obvious defects in health principles, including diet. Beware of the serious conditions which may present themselves in the form of simple constipation. Rule out the simple local cause by anal and rectal examination. Do not prescribe laxatives if you can possibly help it, and remember that contrary to the popular belief constipation is not the prime cause of headache, depression, insomnia, anorexia, and lethargy, but an incident in a neurosis requiring thoughtful consideration.



SOME MINOR MEDICAL MALADIES OF OLD AGE

By TREVOR H. HOWELL, M.R.C.P.Ed.
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OLD age is not necessarily a time of enfeebled health or grave disease. But it is, *par excellence*, the period of life in which both men and women are likely to be afflicted by minor maladies. To give an illustration of what is meant by this, I will briefly describe three cases.

Among the most striking of Chelsea Pensioners is an ex-Guardsman, tall, well-built and handsome. During the last few years this man has often been under the care of the medical officers. None of his complaints has been in any way dangerous to life; nor has he suffered more than transitory discomfort because of them. Such provisional diagnoses as "ulcer of leg", "tracheitis", "cystitis", "vertigo", "umbilical ulcer", and "hæmaturia" have been the headings of his case sheet on successive admissions to the Infirmary. But when not in hospital, this man was able to carry out light duties, to make his way about London and to live a normal life in relative comfort and happiness. This case may be taken as an example of one type of elderly person who has many minor complaints, but is never very ill. During a survey of the healthy pensioners in the Hospital, it was noted that, among thirty-seven old men, all aged seventy-two, this fellow had the lowest blood pressure (110/60 mm. Hg) and arteries which were softer than the average for his age-group. In contrast to him may be mentioned another pensioner, aged ninety, remarkably alert for his years, who has had hardly a week's illness in thirty years. But osteoarthritis of the hip so limits his movements that he cannot walk far, nor yet climb stairs. Such a crippling disability as this must be regarded as a major disease rather than a minor malady. A third old man who comes to mind is one who became "simple" at the age of sixty-five. This poor fellow had to be dressed and bathed by an attendant; he took in little of what was said to him and remembered nothing of recent events. His physical condition was good and he rarely ailed, but his mental state was so impaired that he, too, could not be regarded as suffering from anything but a major disorder.

Having these three cases in mind, it is possible to begin selecting some of those diseases which may fairly be included within the scope of the term "minor malady". First must be excluded those conditions which either endanger life or greatly limit the mental or physical activity of the person who is afflicted by them. Such illness as advanced cardiac disease, malignant new growths, the pneumonias, severe arthritis and certain mental disorders must certainly be considered major pathology. But between these and the various conditions to be discussed hereafter, there is an intermediate group of diseases which are not grave in themselves except when complicated by secondary factors. Chief among these are bronchitis and high blood pressure.

BRONCHITIS

As everyone knows, the severity of bronchitis may be so great as to cause death in an old person; on the other hand, it may run so benign a course that the patient does not even need to take to his bed. In a series of eighty-eight Chelsea pensioners with bronchitis which did not develop into pneumonia, no less than forty-six had the disease in a mild form. Their symptoms were cough, with or without expectoration, and slight discomfort, without a temperature rising above 100° F. at any time. All did well with rest in bed, warmth, and a simple expectorant mixture. Among the remainder, the disease developed into a more severe form. Twenty-seven had a temperature occasionally above 100° F., and thirty-three had wheezing chests showing bronchial spasm; twelve of these being pyrexial. No less than twenty-two of the group later went into some form of cardiac failure and eventually died. Nearly all those who showed the severe form of the disease were admitted to the Infirmary on several occasions. Some were inmates during the greater part of every winter for five or even ten years, whilst a few went in and out three or four times a year. Those in the group of mild cases, on the contrary, rarely had a second attack, nor did they show any sequelæ of importance. So far as they were concerned the bronchitis was just an unimportant incident in their lives. Hence I termed this type "incidental" bronchitis, as opposed to the chronic recurrent, graver type: one is just a minor malady; the other is definitely not.

HYPERTENSION

It is not unusual to find a relatively high blood pressure in persons over the age of seventy. Out of a series of 341 healthy Chelsea pensioners, no less than 77 per cent. had systolic figures over 160 mm. Hg. Many of these men were known to have had pressures at this level for several years, during which time they remained quite fit and active, considering their age. It would therefore seem that hypertension *per se* is not a great liability in most old people; but, on the other hand, it has been noticed that a previous high blood pressure is the most common antecedent of senile heart failure. The form usually labelled "myocardial degeneration" is almost always the result of past hypertension. This often makes its appearance when some intercurrent infection, such as bronchitis, has disturbed the *status quo*. Anything which causes a fall of pressure from a previously high level is associated with a bad prognosis. Among sick pensioners it seemed that this observation could be used as a guide to progress in cases of infectious disease, new growths and heart failure. As the systolic figure approached 110 mm. Hg, so did the outlook become more and more grave. This appeared to be the critical level, below which a fatal ischæmia took place.

One of the most common symptoms in the aged is *vertigo*, almost always associated with hypertension. The way in which this disorder is relieved by small doses of phenobarbitone suggests that it may not be due to irreversible

organic changes. Of course, many of the more dramatic episodes of old age occur in those whose blood pressures are high.

Such events as *epistaxis*, *hæmoptysis*, *hæmatemesis* or profuse bleeding from the rectum, are more often due to hypertension than to local disease, such as ulcer or new growth. Out of fifteen cases of *hæmoptysis* occurring in old persons, no less than ten were due to high blood pressure. Among five cases of *hæmatemesis*, three were of hypertensive origin. There was sufficient time to confirm the initial clinical and radiological diagnosis which excluded local disease, since all these patients remained under constant supervision for periods varying from three to five years after their original attack.

It is of some interest to note that although *cerebral hæmorrhage* usually takes place in association with hypertension, only forty deaths at the Royal Hospital, out of nine hundred and sixteen occurring between 1918 and 1930, were due to this cause.

FIBROSITIS

Undoubtedly the most common minor malady of old age is fibrositis. Sites usually affected are the upper part of the trapezius muscle (by far the most usual), the deltoids, the glutei, the biceps, and the fascia lata of the thigh. In the trapezius, pain from the rheumatic nodules is often referred up into the neck or down the arms, suggesting a neuritic distribution. When on the outer aspect of the thigh and the inner side of the upper arm, the lesion often takes the form of tender swollen fibrils which give a rippling sensation under the fingers which palpate them. Sometimes a neglected case may show an area of affected muscle matted together into a diffuse tangled mass. Also, a joint which is the seat of osteoarthritis will sometimes have patches of fibrositis in the muscles and fibrous tissues which overlie it. In such cases, much of the pain which troubles the patient arises in the fibrositic lesion rather than the joint disorder itself.

For old people, the most beneficial line of *treatment* in this condition seems to be some form of heat combined with deep massage. Diathermy is not usually necessary, but infra-red rays, radiant heat, the radiations from a gas fire or an electric radiator, even a half-filled rubber hot-water bottle, may be used with benefit. It is important to have the affected site well and deeply massaged in order to break up the rheumatic nodules or corrugations. To forward this purpose, it was usual at the rheumatic clinic in the Royal Hospital to have compound ointment of mercury (Scott's dressing) massaged into the part while it was being heated under the lamp. This method gave good results, only 5 per cent. of the patients not responding quickly. The procedure of injecting the nodules with local anæsthetic and saline, so effective in younger persons, is less successful in the elderly. Quite often there is a painful reaction, with local swelling and discomfort for two or three days afterwards, which deters the victim from further treatment.

As regards drugs in this condition, sodium salicylate and the iodides are disappointing. The analgesics of choice are aspirin, phenacetin and phenazone, either separately or in various combinations.

BACKACHE

The most common form of backache in old people is sacro-iliac strain, which often ensues after unusual exertion. It responds well to support with Elastoplast, applied from the front of the anterior superior iliac spine, round the back, to a similar spot on the other side of the body. Two shorter, overlapping, parallel pieces below the first may be added with benefit: but all three must be drawn tight when applied, to give the best result. If this fails, short wave diathermy usually gives relief.

DISORDERS OF THE NERVOUS SYSTEM

One of the most troublesome diseases of the nervous system in old age is *herpes zoster*; not on account of the painful onset, but because of the neuralgia which so often follows. This dolour is usually most trying at night, when it prevents sleep. In the opinion of many patients, the aspirin or phenazone which eased the pain during the day seems less effective at night. Some get nocturnal relief from veganin or the compound codeine tablet of the N.W.F., but it is often necessary to combine a sedative with these analgesics to ensure adequate rest, Roche's "allonal" tablets, or Duncan & Flockhart's "somnaseds" being suitable combinations.

Another condition which is resistant to therapy is true *neuritis*, i.e., not secondary to fibrositis. The most suitable treatment in this disorder is rest, support and heat, to which some authorities add the use of the galvanic current. Massage is definitely contraindicated, and the less the patient uses the affected part, the better.

In cases of *sciatic pain* not due to fibrositis, three weeks' complete rest in bed is almost a *sine qua non*. Patients must be kept as flat as possible during this time, to get the best results. If no great improvement has taken place at the end of this period, it is advisable to seek the opinion of a neurosurgeon as to a possible lesion of an intervertebral disc.

Parkinson's disease is another common neurological disorder of the aged. In many cases it interferes but little with normal function, and, since it is compatible with long life, it may be regarded as a minor malady. Treatment by drugs of the belladonna group is often partially successful, but the actual preparation most suited to a given patient must be found by trial and error. As in other diseases of old age, one man's medicine is another man's poison. It is of some importance to distinguish the gait of Parkinsonism from the shuffle which indicates that a patient no longer has the strength to pick up his feet properly. The latter may be seen in advanced arteriosclerosis, when the blood pressure can no longer offset the peripheral resistance and ischæmia is beginning to affect the vital functions. It also occurs in patients

with a malignant new growth, who are struggling against increasing weakness, not wanting to take to their beds. Hence the onset of this gait is a sign of some prognostic value.

DISTURBANCES OF SLEEP

As age creeps on, sleep habits often change into frequent dozing by day and periodic wakeful spells by night. There are always a number of old people who, having slept all afternoon, complain that they cannot have a good night's rest as well. When hypnotics are needed, a combination of chloral hydrate and sodium bromide is usually satisfactory. If this is ineffective, larger doses may not give the desired result but sometimes cause bromide intoxication. Chloral hydrate alone, in doses of 30 grains, is better. Barbiturates, such as medinal or luminal, do not suit many old persons and should not be relied upon too much. Some patients will take paraldehyde, whilst others loathe it. When available, the use of whisky as a night-cap has much to recommend it for the elderly. Of course, nocturnal restlessness is sometimes a sign of mental deterioration in the aged and arteriosclerotic. It is difficult to distinguish between senile dementia and cerebral arteriosclerosis by clinical means, as the state of the peripheral arteries is not a reliable guide. But when there is irritability during the night or emotionalism with easy weeping by day, organic vascular changes are likely. Many patients showing these traits later have signs of a cerebral thrombosis.

DIGESTIVE DISTURBANCES

To any practitioner who has worked for long among old people, the minor digestive troubles of senility seem to be without rhyme, reason or end. Constipation is common, *flatulence* is frequent and dyspepsia a daily diatribe. When such patients are investigated by test meals and X-rays, the results are apt to be uninformative; hypochlorhydria being the only common positive finding. When this is present, they may benefit by taking a mixture containing nitro-hydrochloric acid with their meals. Few senile cases improve on alkaline powders, but some dote on carminatives. Creosote often gives relief to those suffering from flatulence, and may be administered in the form of pills, capsules or Oppenheimer's bipalatinoids of creosote and soda mint. Some writers have suggested that continual abdominal flatulence is a sign associated with malignant disease of the gut. In my experience it is more often an accompaniment of marked arteriosclerosis.

As regards *constipation*, it may be said that old folk love their laxatives and ponder on their stools. Many are not satisfied with one good motion a day, but would do more. It is often necessary to prevent them from taking purgatives which are too harsh. An ounce of the emulsion of liquid paraffin, with or without 60 minims of liquid extract of cascara, is admirable for the feeble elderly patient. The more robust do well on the compound mixture of magnesium and senna (B.P.), or salts followed by hot tea. Most of them

prefer their aperients with the addition of antispasmodics and carminatives; a little hyoscyamus and ginger giving relish to their taste and warmth to their stomach.

Of course, a persistent or recurrent *diarrhœa* raises the question of excessive purgatives. But many new growths of the gut present themselves for the first time in this way, instead of the more classical constipation. Epidemic infective diarrhœa, which was so common a cause of death in mental hospitals and other institutions, responds very well to sulphaguanidine. Thus has been gained control over another of the men of death which carried off so many old folk in the past.

The final minor malady of the digestive system to be considered is *cholecystitis*. This disease is not uncommon among the aged, and tends to be recurrent, with attacks once or twice a year. As a rule each attack subsides in two or three weeks without any complications. Since the sufferers are not good operative risks, it is preferable to treat them symptomatically rather than surgically. The regime of choice is rest in bed, the application of local heat, a suitable light, fat-free diet and opiates. Chlorodyne seems to be especially grateful to such patients.

DISORDERS OF METABOLISM

Among the metabolic disorders, *gout* is the most common in senescence. It yields to colchicum (or colchicine) and local applications, of which a kaolin poultice is usually the favourite. Heat in the form of infra-red rays is also beneficial to most patients. There has of late been a tendency to administer colchicine, 1/60 of a grain every hour or two, until either pain is relieved or gastro-intestinal symptoms appear. It is said to be an improvement on the old method of tincture of colchicum given thrice daily. Following the attack, a mixture containing sodium salicylate should be administered for a time to assist excretion of urates. Exclusion of nucleoprotein from the diet is advisable, as is abstinence from alcohol. But old people are greatly attached to the pleasures of the table, and most of them eat not wisely but too well. It takes time for them to learn that they must either refrain or suffer.

Diabetes is quite a different matter in old folk. When starting in senescence, it takes a mild form as a rule, which diet alone is able to control. If insulin is required, only small doses are necessary. As with gout, the difficulty is to get patients to diet properly.

CONCLUSION

It will, of course, be realized that the selection of minor maladies discussed above is but a handful of those encountered among old people in hospital or general practice. Since trifling matters often distress the aged more than great ones, it is well for the practitioner in attendance to give thought to their worries. The old need more consideration, not less than the young; and it is not an ignoble task to devote time to comforting those whose race is nearly run.

THE TREATMENT OF CHRONIC FAUCIAL DIPHTHERIA BY TONSILLECTOMY

By F. BOYES KORKIS, M.B., F.R.C.S.ED., D.L.O.

Major, New Zealand Medical Corps.

IN 1945, as winter was drawing to a close, and during the spring, large numbers of cases of faucial diphtheria were admitted to a Military General Hospital in Italy. After a lapse of several weeks some of these patients were still showing positive pharyngeal swabs, and these were referred by the Medical Division to the Ear, Nose and Throat Department for an opinion as to future management; in particular, suggestions were asked for on the best means of reducing the considerable loss of manpower occasioned by the need for continued isolation.

Local medications had already been tried unsuccessfully—various local antiseptics, the cleansing of the pharynx by a multitude of gargles, and the use of penicillin lozenges sucked continuously while the patient was awake. In one case, 500,000 units of penicillin had been administered by the parenteral route without effect, the throat swabs remaining positive.

In every case referred to the department the tonsils were still present, either wholly or, as in one case, partially, large tonsillar remains being present. This striking fact suggested that the tonsils were the source of the persistent infection. In view of this finding, the failure of local treatment was not surprising, as the probable focus would lie in the depths of the tonsillar crypts, their depth and their tortuosity, together with the inflammatory swelling of their lining epithelium and the presence of inspissated debris within their lumen, preventing any remedy applied locally from reaching the site of the primary disease. Further local treatment of a conservative nature was therefore not advised.

Knox (1945) has shown the effect of penicillin on cultures in liquid and solid media, the most rapid lysis taking place at the maximum rate of multiplication of the organism. Todd (1945) has elaborated the same point. In the case of an infection which has become chronic, and more or less static, such conditions are not likely to be present *in vivo*; hence the probable cause of the failure of penicillin in the case treated by the parenteral use of the drug. Therefore the most effective way of dealing with the focus appeared to be the radical one, with ablation of the areas which were most likely to be the offending factors—namely the faucial tonsils.

Many writers consider the diphtheria carrier to be an indication for tonsillectomy, amongst them being Logan Turner (1936) and Dan McKenzie (1927). McKenzie, in a clear-cut statement, strongly advocated the operation for this condition :—

“The diphtheria bacillus may linger on almost indefinitely in the throat of patients who have recovered from the attack. It may also be found even in people who have

never suffered from clinical diphtheria at all. Such carriers are infectious to those about them, and as their isolation for a prolonged period is highly inconvenient, many devices have been tried to bring about the disappearance of the organism from their throat. Perhaps the most successful method of all is to perform tonsillectomy and to remove the adenoids if they are present."

Irwin Moore (1928) is even more emphatic. He states that "carriers must be rendered harmless by tonsillectomy and adenectomy, since treatment is of no avail."

Apart from such general advocacy of the operation, detailed references in the literature are surprisingly few. Such important questions as the following remain unanswered:—

(1) How long a period must elapse after the acute attack before it is justifiable, and safe, to operate?

(2) Is it in the best interests of the patient to use a local, or a general anæsthetic?

(3) Are toxic complications seen after operation?

(4) Should a further dose of antitoxin be administered pre-operatively to combat a possible flare up in toxicity?

(5) Will the use of penicillin, given parenterally, help to prevent post-operative toxic manifestations?

(6) How long does it take for the positive swabs to change to negative ones after the operation has been performed?

(7) Will this period of infectivity be lessened by the use of penicillin?

This article is written in an attempt to elicit some further information on these practical points.

REVIEW OF THE CASES TREATED BY TONSILLECTOMY

The total number of cases treated by operation in this series was twenty-seven, and, with one exception, all had had acute faucial diphtheria. The exception was a contact whose throat was found to harbour the diphtheria organism on routine swabbing, no clinical manifestation of diphtheria being in evidence.

All the cases occurred in adult males on active service in the Italian theatre of war, and all continued to return positive pharyngeal swabs, either persistently or intermittently. The Pathological Department took especial care to exclude the possibility of the organism being of the diphtheroid type.

All patients, with the exception of the acclinical one cited above, had been given anti-diphtheritic serum in amounts varying from 24,000 to 96,000 units, upon suspicion or upon positive diagnosis. Seven had had, in addition, a course of sulphonamides in dosage of from 23 to 39 gm. One patient had been treated with 500,000 units of penicillin given by the intramuscular route. The swabs remained positive. Unfortunately the penicillin sensitivity of the organism in this patient was not investigated.

Selection of cases for operation.—Certain criteria were adopted in choosing those cases suitable for tonsillectomy.

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The colour quickly improved and the pulse rate dropped to under one hundred per minute after the return of these patients to their beds.

POST-OPERATIVE COURSE

The post-operative course of all the patients was smooth and uncomplicated: they were allowed out of bed after forty-eight hours and were fully ambulatory on the fourth post-operative day.

(1) *General condition post-operatively.*—(A) Temperature and pulse. It was usual to note an elevation of temperature, and an increase in pulse rate in the first forty-eight hours after operation. The pyrexia was in the region of 99° to 100° F. on the first day, dropping to 99° F. on the second, whilst a corresponding rise of pulse rate to 90 or 80 per minute occurred on these days. In the typical cases, temperature and pulse became normal on the third day. Figure 1 shows the general reactions. In a few cases there was no pyrexia but a quickening of the pulse was recorded for the first twenty-four to forty-eight hours, an example being shown in figure 2. In one case the temperature and pulse were raised to a greater degree on the second than on the first day, being normal on the third. An excessive local reaction was observed in this case, due to the presence of hæmolytic streptococci. No diphtheria organisms were demonstrated in any post-operative swab, so that the general reaction was accounted for by the local sepsis due to the pyogenic organisms (see figure 3). In every case operated upon both temperature and pulse were normal by the end of the third day. The reactions seen were no greater than those often recorded after an ordinary tonsillectomy.

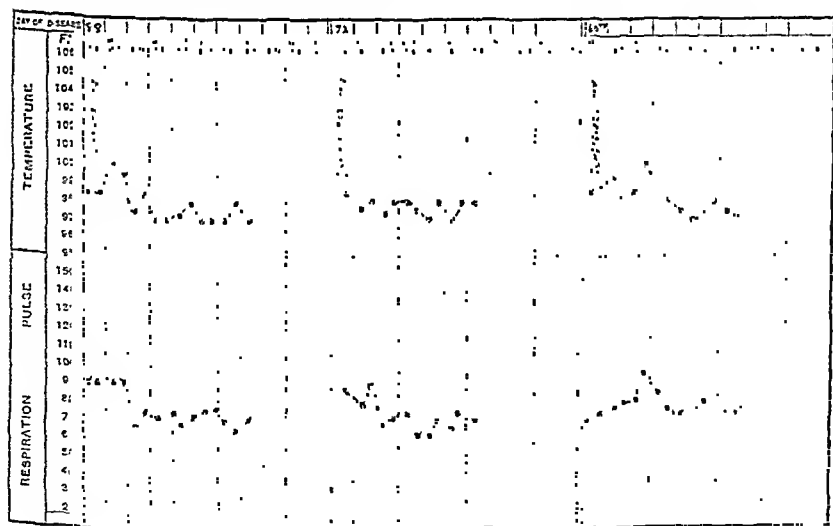


FIG. 1.

FIG. 2.

FIG. 3.

(B) Chest complications did not occur.

(C) No neurological symptoms or signs followed operation.

(2) *Local condition post-operatively.*—The degree of after-pain was not excessive. Neither reactionary nor secondary hæmorrhage developed in any case. The fossæ showed rather less slough than after an ordinary tonsillectomy, except in one case in which the local condition was considered excessive, and was accompanied by an

(1) A minimum period of eight weeks from the date of onset of sore throat, with persistence of positive swabs, in the case of the twenty-six cases of clinical diphtheria. A period of six weeks was allowed for nature to effect a cure in the aclinical case.

(2) The general condition of the patient was such as to allow of his being ambulatory in his ward for one week before operation.

(3) No patient showing evidence of cardiac involvement was operated upon.

(4) No patient showing signs of neurological involvement was accepted for operation.

Groups of cases.—The cases were divided into two main groups, those who were given penicillin, and those who were not.

(A) The penicillin group numbered fifteen cases. Each patient was given the drug by the parenteral route before and after operation; 15,000 units, three-hourly, for twenty-four hours before going to the theatre (120,000 units), and the same dosage for forty-eight hours post-operatively (240,000 units). The total dosage of penicillin used in each case was therefore 360,000 units. Of the fifteen cases so treated, five were anaesthetized by a general anaesthetic, local anaesthesia being used in ten.

(B) The non-penicillin cases—twelve—received no protection, except in one case in which 48,000 units of anti-diphtheritic serum was administered pre-operatively. It was felt that little was to be gained by giving more anti-serum, as massive doses had been administered in the early days of hospitalization. Should toxicity reappear, further anti-serum could be given at once. In this group general anaesthesia was employed in three cases, and local in nine.

THE OPERATION

Method.—Little need be said of the surgical technique employed. In each patient the tonsils were carefully dissected from their beds, the lingual extension being searched for, and removed when present. Absolute hæmorrhage was secured before the patient was returned to bed, but, whenever possible, the ligation of bleeding points was avoided in an effort to reduce after-pain and to lessen the amount of post-operative slough in the fossæ. Adenectomy was not performed.

Operative difficulties.—No undue difficulties were encountered in any of the cases. Primary hæmorrhage from the tonsillar beds was very slight, except in two cases in which moderate hæmorrhage from the tonsillar fossæ was met with, but which was easily controlled by routine surgical means. A good plane of dissection was found in every case. The tonsils removed were usually large, and in four cases very large and fleshy, for an adult.

At the termination of operation a generalized pallor and a tachycardia were encountered in three cases operated upon under local anaesthesia. This was not recorded in those cases in which general anaesthesia was employed.

The colour quickly improved and the pulse rate dropped to under one hundred per minute after the return of these patients to their beds.

POST-OPERATIVE COURSE

The post-operative course of all the patients was smooth and uncomplicated: they were allowed out of bed after forty-eight hours and were fully ambulatory on the fourth post-operative day.

(1) *General condition post-operatively.*—(A) Temperature and pulse. It was usual to note an elevation of temperature, and an increase in pulse rate in the first forty-eight hours after operation. The pyrexia was in the region of 99° to 100°F. on the first day, dropping to 99°F. on the second, whilst a corresponding rise of pulse rate to 90 or 80 per minute occurred on these days. In the typical cases, temperature and pulse became normal on the third day. Figure 1 shows the general reactions. In a few cases there was no pyrexia but a quickening of the pulse was recorded for the first twenty-four to forty-eight hours, an example being shown in figure 2. In one case the temperature and pulse were raised to a greater degree on the second than on the first day, being normal on the third. An excessive local reaction was observed in this case, due to the presence of hæmolytic streptococci. No diphtheria organisms were demonstrated in any post-operative swab, so that the general reaction was accounted for by the local sepsis due to the pyogenic organisms (see figure 3). In every case operated upon both temperature and pulse were normal by the end of the third day. The reactions seen were no greater than those often recorded after an ordinary tonsillectomy.

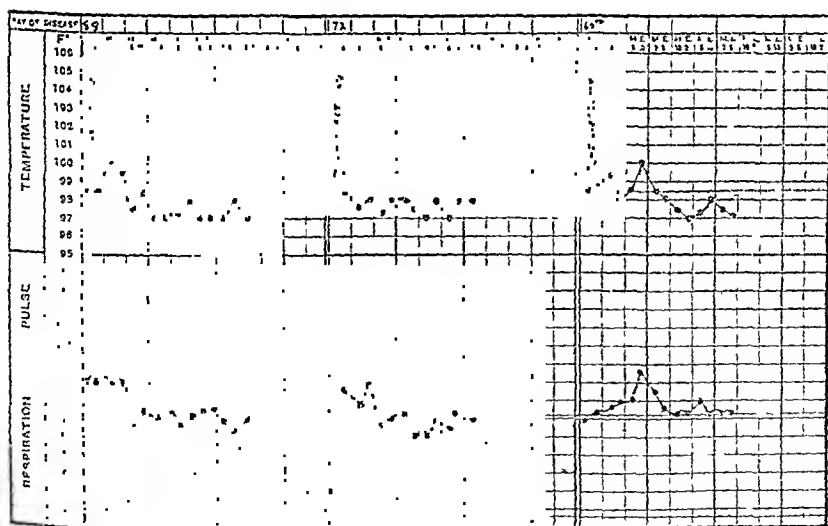


FIG. 1.

FIG. 2.

FIG. 3.

(B) Chest complications did not occur.

(C) No neurological symptoms or signs followed operation.

(2) *Local condition post-operatively.*—The degree of after-pain was not excessive. Neither reactionary nor secondary hæmorrhage developed in any case. The fossæ showed rather less slough than after an ordinary tonsillectomy, except in one case in which the local condition was considered excessive, and was accompanied by an

adenitis of the upper deep cervical group of nodes. The local signs showed improvement on the third day when the temperature dropped to normal (see figure 3). No aural complications were seen.

(3) *Post-operative period of infectivity.*—With a view to ascertaining the time required for the elimination of the diphtheria organism, swabs were taken from the pharynx, and especially from the tonsillar fossæ, on alternate days, beginning with the second post-operative day. The criterion of cure of the diphtheritic infection was based on the absence of the Klebs-Löffler bacillus in three successive pharyngeal swabs, taken at two-day intervals. In addition, a final swab was taken before discharge from hospital. An analysis of the twenty-seven cases showed that the first of three negative swabs was obtained on the following days after operation:—

2nd post-operative day	13 cases	48.1 per cent. of cases
4th post-operative day	9 cases	33.3 per cent. of cases
6th post-operative day	4 cases	14.8 per cent. of cases
8th post-operative day	1 case	3.7 per cent. of cases

It will thus be seen that by the fourth day twenty-two of the twenty-seven cases became, and remained, swab-negative, a cure percentage of 81.5 per cent. at this stage of convalescence.

THE INFLUENCE OF PENICILLIN

The penicillin series of cases (fifteen) was contrasted with the twelve cases in which this drug was not given, to determine if the former became non-infective before the latter. The first of three negative swabs was obtained in the two groups on the day shown in the table below.

Post-operative day	Penicillin Series	Non-penicillin Series
2nd	6 cases (40 per cent.)	7 cases (58.3 per cent.)
4th	5 cases (33.3 per cent.)	4 cases (33.3 per cent.)
6th	4 cases (26.6 per cent.)	0 cases
8th	0 cases	1 case (8.3 per cent.)

It will be seen that in the cases treated with penicillin 73.3 per cent. were swab-negative by the fourth day, whilst in the non-penicillin group 91.6 per cent. were non-infective at that stage.

Although the number of cases recorded and compared is small, the results would seem to indicate that penicillin is of no value in helping to clear up the persistent infection in the convalescent carrier. It is the removal of the infected tonsils that effects a cure, and tonsillectomy remains the method of choice in treatment. Bulmer (1945), quoting Tunbridge's studies (unpublished) on the effect of penicillin given locally, makes the same point.

PERIOD OF HOSPITALIZATION

Of the twenty-seven patients treated, seventeen were considered fit for discharge from hospital to duty within fourteen days of operation, whilst a further nine were discharged within three weeks. One patient was discharged on the thirty-third post-operative day, but his long post-operative convalescence was unrelated to his diphtheritic condition, the first of three negative swabs being obtained on the sixth day, and the throat healing within three weeks.

PATHOLOGY

The tonsils were sent to the laboratory for bacteriological and microscopical examination. Unfortunately I was transferred from this theatre of war before the results of most of the sections were to hand, and I am only able to record the pathological findings in two of the cases:—

Macroscopically, the tonsils were greatly enlarged. Microscopically, the sections showed the changes of acute inflammation, especially noticeable in the lymphoid tissue. There were numerous polymorphs, and the vascularity was much increased. The surface epithelium showed hypertrophy in places, with areas of ulceration in others. In the squamous epithelium, organisms resembling diphtheria bacilli could be seen. The crypts of the tonsils were filled with an exudate, in which could be made out numerous organisms of a similar type. The deep epithelium lining the crypts were frequently ulcerated.

In view of these findings it would appear that the persistence of the diphtheritic infection is brought about by the presence of active specific ulceration of the epithelium lining the tonsillar crypts. As local medications cannot reach these areas, tonsillectomy is a justifiable procedure, providing that time is allowed for nature to effect a cure. Perhaps operation should be embarked upon at an earlier period than eight weeks after the initial infection, but further clinical trial is necessary before deciding just how soon it should be carried out.

CONCLUSIONS

Tonsillectomy is a safe, and a successful, method of treatment for the convalescent carrier of diphtheria, whether the operation be carried out under local or general anæsthesia. No toxic reactions attributable to the Klebs-Lœffler bacillus occurred with either method of anæsthesia, and the anæsthetic of choice can be that usual to the operator. Penicillin does not help to lessen the post-operative period of infectivity when given at the stage at which these operations were performed. All cases were swab-negative eight days after operation but 81.5 per cent. became, and remained, negative by the fourth day. In view of the nature of the lesion and its site, prolonged local medication is unlikely to lessen the period of infectivity.

I should like to express my grateful thanks to Lieut.-Col. J. Easton, R.A.M.C., to the physicians under his command, and to Major R. Riddell, Pathological Specialist, R.A.M.C., for their unfailing cooperation in this investigation. The assistance of my orderly, Corporal O. R. Riley, N.Z.M.C., has been most valuable in the keeping of records.

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DYSPEPSIA OF PEPTIC ULCER TYPE AND ITS RELATIONSHIP TO PERSONALITY TYPE AND ANXIETY

By BERNARD M. C. GILSENAN, M.B., B.S., D.P.M.

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THAT there is a relationship between dyspepsia of the peptic ulcer type and anxiety has long been recognized by physicians, but this important relationship does not appear to have influenced treatment as much as might have been anticipated. A recent medical commentator expresses himself as satisfied that "orthodox diet, alkalis and supplementary vitamins B and C" represent the most efficient treatment for duodenal ulcer to date. No mention is made of the stresses producing the ulcer which, if left unmodified, are just as likely to produce a recurrence, nor of the increasing amount of evidence pointing to the relationship between the peptic ulcer type of dyspepsia and personality type.

Stewart and de Winsor (1942), in an article on the incidence of perforated peptic ulcer as an effect of heavy air raids, state that the first reference they were able to find to the relationship of personality make-up, anxiety and ulceration was in Heberden's Commentaries in 1782. They refer to the more recent work on the subject by Davies and Wilson, who were able to show that 80 per cent. of ulcers, relapses, hæmatemesis and perforations followed a definite period of anxiety. In 100 hernia controls such anxiety only preceded the lesion in 20 per cent. of cases. Davies and Wilson put forward the thesis that the ulcer patient possesses all his life a certain kind of personality or psychological make-up and that the development of his ulcer or ulcer dyspepsia is determined by disturbing situations or events, especially those that threaten his economic security, increase his responsibility or concern the members of his family. These authors refer to the typical appearance of sufferers from peptic ulcer, the long thin face, the sharpened nose, and the deep lines from *alæ nasi* to the angles of the mouth which together make the typical facies, and quote Draper and Fouraine "An alert watchful expression which conveys a suggestion of continual apprehension mixed with defiance. A serene contented facies is never seen".

Draper says that "many human beings pass through similar environmental influences without evident damage but peptic ulcer is a case of selective environmental action on favourable constitutional terrain". Among other authorities who agree with this are Hurst (1921), and Crohn. Experimental ulcer and psychosomatic studies have been made by Cushing (1932), and Wolf and Wolff (1942), and others, their work being summarized by Kanevsky (1943) as follows:—

(a) Neural pathways existing as an anatomic bridge between psychic centres and soma.

(b) The gastric phenomena, such as hyperchlorhydria, hypermotility and hyper-

tonicity, which are shown by most peptic ulcer patients, can be produced by stimulation of the neuro-vegetative centre in the diencephalon—a centre easily affected by psychic trauma.

(c) The peptic ulcer lesion is limited to about four inches of the lesser curvature of the stomach and the first inch of the duodenum, because this region is richest in vegetative nerve supply.

(d) Wolf and Wolff (1942), observing the stomach through a fistula, have seen the local gastric manifestations and the actual production of an ulcer in a patient, initiated through psychogenic stimulation.

Kanevsky goes on to say:—"A striking uniformity of temperament is noted; the lethargic ulcer patient is a rarity. Ulcer is found in individuals who are under a constant nervous and mental strain or whose psychologic make-up is such that they impose such an environment and mental state on themselves by virtue of their intensely ambitious and driving traits—although of apparent independence and of the 'wide-awake', 'go-getter' type, and at the same time extremely efficient and persistent, they are frequently frustrated in the pursuit of their activities by their too labile energy supply. Their quick fatiguability and little endurance necessitates frequent rest periods which, when combined with food and relief from anxiety, promptly rehabilitate them. Adding more to their frustration are their standards of perfectionism and conscientiousness which fasten their attention to their projects and allow for no mental relaxation when physical fatigue ensues".

Several authors have referred to the fact that, in spite of their sustained reaction to psychic trauma, these patients often show external emotional control, whether this is due to their self-consciousness, extreme sensitivity or to mass pressure. Mittelman and Wolff (1942) describe peptic ulcer patients as commonly showing "assertive independence and self-sufficiency covering underlying anxiety and insecurity, and accompanied by feelings of resentment and hostility. Basically there are feelings of insecurity and dependence but these are disguised and compensated for by perfectionism and a show of independence and the assumption of excess responsibility".

Culpin, Wittkower, Rodger and Wilson and Flanders Dunbar have contributed to the knowledge of personality type and its relation to peptic ulceration, and Mitchell and Mullin (1944), writing of the neurotic dyspeptic soldier, give a few "personality pointers" of gastrics and neurotic controls:—

Timidity: 62 per cent. gastrics; 42 per cent. controls.

Solitariness: 54 per cent. gastrics; 39.5 per cent. controls.

Obsessional traits: 44 per cent. gastrics; 15 per cent. controls.

It was while working as an army psychiatrist on War Office Selection Boards that the relationship of a certain personality type to dyspepsia of the peptic ulcer type was impressed upon me. During the course of psychiatric studies, aided by the latest psycho-diagnostic technique, on officer candidates, the frequency with which a history of dyspepsia was associated with a characteristic psychological make-up was striking. This may be designated the obsessional character, the more striking characteristics of which are exemplified in the composite picture that follows:—

The cautious, reliable, conscientious, often over-serious man who is ambitious and self-driving, finding it difficult to relax. He finds in work frequently his only outlet and when perforce not at this attacks his leisure time with the same relentless fury. A stickler for order and routine, he is characteristically neat and tidy, not only in his work but also in his appearance and even handwriting. When in charge he tends to drive his subordinates at the same pace as he drives himself, sometimes with unfortunate results. He dislikes change and prefers to work against a familiar background. His susceptibility to rebukes and fear of failure make him take every step to avoid these, hence his value as the reliable subordinate. A prey to indecision and scrupulosity, responsibility entailing the taking of risks and dealing with the unusual tends to cause him more than ordinary anxiety. Typically unaggressive, at least as regards outward expression, he is found more often in the "clerkly" departments of the army than in the combatant arms, hiding his inner emotional insecurity behind the rules and regulations which are for him both a weapon and a refuge.

Not all obsessional characters react to their anxiety with gastric symptoms, but a great number of the candidates who refer to dyspepsia in their health questionnaire conform to this type. So much so that at the mention of "gastric stomach" the army psychiatrist automatically pricks up his ears. The more intelligent type of candidate frequently admits that anxiety is the main source of his dyspepsia.

So much for the personality type that appears particularly vulnerable to psychosomatic disturbance of acid dyspepsia type. What of the environmental disturbances to which these personalities are most susceptible? Davies and Wilson have classified them loosely under four headings—those connected with (1) work, (2) money, (3) illness, (4) other causes. They found that of 113 male patients only 20 had no disturbance and of 92 women only 13 had no disturbance. Stress of one kind or another is almost inevitable in our present highly competitive society, and it may often be difficult or impossible to modify or abate this, as often the problem is more properly a socio-economic one. The psychiatric approach is limited by this but can in many cases achieve a better adjustment.

At any rate the general practitioner, to whose lot falls the management of most of these cases, would do well to bear in mind the psychiatric as well as the medical implications. As anxiety and personality structure appear to be of etiological significance in the production of peptic ulcer, this appears to be a field in which the psychiatrist has a part to play. Recent psychiatric researches point the way and, if they lead to a better understanding of this widespread cause of disability and to increased cooperation between psychiatrist and physician, their work will not have been in vain.

Until this happy state comes about, I venture to think that rest, sedation and, when possible, environmental readjustment, are likely to produce better results than those obtained by the treatment in general use to-day.

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EARLY RECOGNITION OF DISEASE

VI—MENTAL DISORDERS

By AUBREY LEWIS, M.D., F.R.C.P.

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MENTAL illness would more often be recognized by the practitioner in its early stages if the patient were as prompt in seeking help for it as he is when he has a pain in his abdomen or a broken limb. Many of the early symptoms of mental illness are explained away, hidden or overlooked, by the patient and his relatives: it may not even occur to them that this is something about which to seek medical advice. The first obstacle to early recognition therefore lies in the tendency people have to disguise mental symptoms from themselves or from the world; they find pseudo-rational explanations for their psychological discomforts; they fear that they will expose themselves to ridicule if they report this or that symptom, and that if they let slip some queer belief they hold or strange trick of the senses they have noticed, they may find themselves sent willy nilly to a mental hospital. Their feelings of guilt are construed by them as a matter of moral, not medical, concern; their lapses of memory are thought to be of no consequence. Often it is only when the symptoms have become unbearable or obvious that medical advice is sought. Something can be done by public education to get people to ask medical advice sooner than they do now for some of their psychological ailments: not, of course, by telling them all the early symptoms that they must watch for and thus offering grist to the hypochondriac mill, but by correcting the prejudices and groundless fears which cluster around the notion of mental illness.

THE ASSESSMENT OF EARLY SYMPTOMS

Sometimes it is the patient, sometimes the relatives, who persist amazingly long in remaining blind to the manifest symptoms of mental disturbance. When at last the practitioner is consulted, the first question he must consider is how far the symptoms deviate from the patient's normal condition, what relation they bear to his personality. In the early stage of a mental illness, it will often seem that a mountain is being made out of a molehill, that the patient is asking advice about a trifling upset hardly worthy of the name of symptom; or, at the opposite extreme, the queer experiences and eccentric beliefs that he recounts may be regarded by his intimates as instances merely of his lifelong oddity of outlook, which they rightly consider to be compatible with sensible conduct in all the major business of life, whereas a stranger making no allowances for the patient's habitual way of talking and looking at things might take them for delusions and hallucinations. In psychiatry, symptoms are often personality traits "writ large"; it is therefore important not to mistake a characteristic that has always been part of the patient's mental constitution for a sign of incipient illness, nor, on the other hand, to minimize an early symptom because it seems to have

developed so naturally out of the patient's ordinary personality. In children, especially, the fault of regarding a normal as a morbid act of behaviour can lead to as much mismanagement as the opposite error. In avoiding it an understanding of the patient's normal personality, based on inquiry from the relatives as well as examination of the patient, is essential. Equally necessary is consideration of whether or not the symptom can be accounted for by the patient's recent circumstances, he being the sort of person he is. He complains, for instance, of feeling depressed and listless, his friends report that he seems to think he is being followed about and spied upon; and such words as "persecution", and "paranoid" begin to appear in the opinions expressed about him. But if, for example, he is a Frenchman who was concerned between 1943 and 1945 in distributing a clandestine newspaper of the Resistance, whose two closest friends were shot, and whose elder brother is awaiting trial for pro-German activities, it may be decided that these "early symptoms" are hardly symptoms at all, but are normal responses to distressing circumstances, and far less ominous or indicative of a pressing need for medical assistance than if they sprang from remote and harmful causes, lying within his mental structure rather than outside him.

The detection of early symptoms in psychiatry is seldom a matter of spotting a significant peculiarity or disease: it requires that a situation be recognized. What is early in the development of the actual illness, may be late in the warping of personality which has conduced to the illness. If the purpose of early recognition be prevention and effective treatment, then it is the threatening situation that needs to be recognized as promptly as possible, without waiting for the symptoms of the actual breakdown. Whilst this is, of course, often a counsel of perfection, it is useful to bear in mind that mental illnesses sometimes grow insidiously out of the patient's ordinary personality: early symptoms may mean late trouble. The main precept in early detection must therefore be "examine the mental state as carefully as you do the physical, and remember that you can't examine anybody's mental state without a knowledge of his history that it will take time and patience to collect". It hardly needs to be stressed also that mental illnesses may first come under notice because of some "physical" symptom such as a local pain or weakness, and that, conversely, mental symptoms may be the early indications of a physical disease. Besides instances of the latter, in which some cerebral affection or metabolic disorder leads to forgetfulness, odd behaviour or other psychological disturbance, there is also the large group of patients whose physical illness shades off in time into a more psychological one, arising out of the situation their physical disease has created; examples of this are common, e.g., a man convalescent from a head injury who is encouraged to regard himself as an invalid; another who has hurt his shoulder at work and is "fighting" a claim for compensation; a child who is advised after his rheumatic fever to keep away from games for fear of damaging his heart. In such cases preventive measures are applicable which anticipate the development of any actual psychological illness, and

make the early detection of the harmful situation more desirable than early detection of the symptoms it will cause in predisposed persons.

ERRORS IN EARLY DIAGNOSIS

Early recognition is not always an unmixed blessing. It can be a misfortune when it leads to precipitate action. Now and again it happens that a patient with transient emotional upset, largely brought about by a bereavement or other privation, is urged to have a course of convulsant treatment, although other measures would be effectual; or a woman of psychopathic personality, who is always quarrelling with her husband and has developed anxiety and irritability, is advised to have a baby. In such cases insufficient regard has been paid to the further dangers inherent in the short cut proposed. Sometimes it is not a short cut but a needlessly long way round that the patient is advised to take, e.g., a prolonged psycho-analysis when simple social measures would be sufficient in the circumstances.

Equally to be guarded against is the misinterpretation of normal experiences and harmless vagaries. The hypnagogic hallucinations which a large proportion of healthy people have when falling asleep may be mistaken for true hallucinations when a patient who expresses himself badly is being hurriedly examined; or the vacuous beliefs of a spiritualist's daughter regarding messages from her dead relatives may be given too much weight. Obsessional trends, mild phobias not intrinsically different from superstitions, lapses of memory and of concentration when tired—these should not be regarded as symptoms of illness unless fuller inquiry into their form and the setting in which they become noticeable indicates that they are outside the range of what is healthy for that individual. This is often a nice question of judgement, as exacting a diagnostic task as any.

THE ESTIMATION OF EARLY SIGNS

Among the most common of early symptoms are fatigue and tension. Often the disproportion between these feelings the patient complains of and any manifest cause for them makes it probable that a psychiatric illness is beginning; but here, as so often in medicine, it is impossible to tell solely from the form of the actual symptoms, whether they are predominantly of physical causation or psychogenic. Because of the need to use a different set of concepts for the physical and the psychological sequences, it is easy to distinguish the two types of cause too sharply, forgetting that in the genesis of anxiety or fatigue changes of structure and emotional responses to external happenings may be closely and even inseparably mingled. The many forms that anxiety can take are familiar to every physician: vague terrors; dread of collapse or sudden death; fear of disease; restlessness; acute attacks with palpitations, dyspnœa, trembling, and other autonomic changes; and less overt indications of the emotional unrest. The early recognition of anxiety is not difficult. But to decide whether the anxiety is morbid, whether it has toxic or other physical causes—there is no anxiety more severe, for instance, than that of delirium tremens—what are its psychological origins and its

clinical accompaniments, its probable course and immediate treatment: these problems call for a grasp of psychiatric principles, and cannot be dealt with by short cuts to "differential diagnosis".

Physical and predisposing factors.—A comprehensive list of the early symptoms of each type of mental illness would be easy to compile but woefully misleading. If in psychiatry there were a number of specific symptoms, recognition of which afforded the key to diagnosis, such a list would have some value. But there are no early psychiatric symptoms which may not arise in the course of physical disease, and few that bespeak the onset of certain illness. A patient may become hilarious, unduly talkative, boastful, extravagant; the change from his former quiet manners is conspicuous, and it is tempting to call the condition a hypomania, to tell the relatives that there is some likelihood of an attack of acute mania, and to consider various ways of checking his excesses by medical and legal means. But closer investigation may show that these symptoms are symptomatic of a cerebral disease, or are the consequence of his hearing some extraordinarily good news which took a weight off his spirit: or are due to one of the trifling mood-swings to which he is liable and which last only a day or two; or are the prelude to a severe depression; or express his usual response to benzedrine which he has taken before his examination; or they indicate that he is drinking more than is good for him, or has recently had an anæsthetic. Another patient has become depressed: it may mean anything from early general paralysis of the insane to a recent bereavement, from schizophrenia to migraine. Unless the duration, the circumstances of onset, the many possible causes, the previous history, the response to various stimuli and situations, are ascertained and weighed, it is impossible to know whether they are significant early symptoms or not. Certainly some florid outburst of insanity, some acute anxiety or obsessional disorder, some striking hysterical paralysis or amnesia may be as plain a diagnostic sign as an epileptic convulsion or a hæmatemesis; but these are so sure to be recognized that no special watchfulness or guidance is needed. Many characteristic features of psychiatric illness, e.g., the grimacing and smiling in schizophrenia, are not usually early symptoms.

Delirium tremens illustrates the dilemma of anyone who wants to lay down simple rules for the recognition of early mental illness. The restlessness, insomnia, and terrors of the first stage of delirium tremens can be easily detected, and in a known drunkard lead to a prompt diagnosis; this, in so far as it brings proper nursing and treatment, is all to the good. But it can be called "early" recognition only by the artificial device of separating this episode in a drunkard's life from the long illness in which it amounts to a dramatic complication. The alcoholism, with its consequent physical and psychological disorders, may have been evident for years; a true early recognition of the illness would therefore have to be pushed back a long way. And even if the addiction had been recognized soon after the excessive drinking began, it would still be a legitimate question to ask

whether there had been an antecedent anomaly of personality in which lay the root of the drunkenness, and whether the recognition of this during the patient's childhood and adolescence might not have constituted the early recognition necessary for effective checks and remedies.

It is not necessary to push such logical but sometimes academic questions to the extreme; often the practitioner has no choice in the matter of early detection, and there are in any case limits to his foresight. But he can, in regard to psychiatric illness and perhaps other illness too, give up any hard and fast notion of when a disorder is still in its early stages, and concentrate chiefly on detecting the tractable aspects, the responsive phases, the corrigible pathogenic influences. Some patients exhibit, soon after the early symptoms have first brought them to the doctor, a welcome but spurious recovery which turns out to have been only a remission, and their prognosis is from the outset worse than that of others who have been ill for years when they first seek medical help. But, in the main, the earlier treatment is instituted, the better, of course, the outlook. In such a disease as general paralysis of the insane this is very plain. It is in respect of the more lifelong troubles—psychopathic personality, for instance, or mental defect—that the advantages of early detection and consequent treatment are less easy to prove. Mental defect cannot be detected with certainty in the first year or two of life, unless it is accompanied by signs of physical disease usually connected with defect, e.g., mongolism, severe hydrocephalus. Appropriate psychological tests will a few years later reveal the intellectual defect, and educational demands force it into prominence. Intellectual inferiority alone, however, must be severe to make some special provision necessary; it is the combination with the intellectual defect of temperamental and social inadequacy that demands institutional care or special supervision for the high-grade defective. It would be a barren dispute that centred on the appropriate time for "early" recognition of this condition; the essential thing is that the child's powers and capacities shall be correctly estimated and his upbringing adjusted as early as possible to his limited abilities.

Since the patient himself, by seeking advice, makes it clear that he feels ill, and since differentiation of the particular disease or reaction-type is, in psychiatry, less valuable than discovery of the main causes of the illness, what is usually meant by "early recognition of *disease*" has here less to recommend it than in some other branches of medicine. But early recognition of the need for specialized psychiatric treatment, when such need exists, is of great importance; sometimes the patient arrives only in time for the psychiatrist to record that there is now a long-standing and unchangeable condition. Whether the mental illness be called a neurosis or a psychosis, or a "borderline condition", it is urgent that the patient who has not improved after a fair trial of the measures adopted by the practitioner should be sent to the specialist early, rather than left until there is some intolerable behaviour or gross abnormality which makes reference to hospital imperative.

REVISION CORNER

It is proposed each month to include short articles in this section, in which experts will summarize modern treatment and clinical procedures, particularly for the benefit of general practitioners who have returned from the Forces. Suggestions for suitable subjects will be welcomed.

THE TREATMENT OF DYSMENORRHOEA

THE cause of severe spasmodic dysmenorrhœa, commonly called "first-day pain", is not known, but it is believed to be due to a combination of spasm of the internal os with an intense contraction of the fundus, sufficient to cause transient ischæmia of its muscle. In other words, the uterus is in a state of "colic". The hypoplastic uterus has been alleged to be a cause of this loss of normal polarity between a contracting viscus and its relaxing sphincter, but Jeffcoat has shown recently that there is no close association between the under-developed uterus and spasmodic dysmenorrhœa. Nevertheless, the true "gynæcoid" woman seldom suffers from monthly pain, neither is she the victim of inadequate function of the uterus in labour or of any other aspect of reproduction. What may be described as the "hypo-gynæcoid" woman, however, often suffers from difficulties at puberty, scanty, irregular and painful menstruation, followed later by infertility, long, painful labour, and a poor supply of milk should she ultimately have a baby.

Thus, in considering the treatment of dysmenorrhœa, or indeed, of anything else, it is important to recognize the personality type of the patient. Further, it is necessary to consider the different types of dysmenorrhœa. First, there is the sharply defined group that suffers severe, often prostrating, pain for a few hours immediately after the flow is noticed. Secondly, the group which complains of much less severe pain as a part of a general malaise, including headache and backache, which lasts for the whole duration of the "period"; and, lastly, the group which feels the chief discomfort during the few days before the flow is established. Patients of the second and third groups are seldom incapacitated, although they may suffer much from general periodic disability. It is the unfortunates of the first group who not only endure agonizing pain, but who also are unable to keep their jobs, and, as the years pass, are demoralized by constantly recurring invalidism. It is this group that will be dealt with in this article.

SPASMODIC DYSMENORRHOEA

Treatment may be considered under three headings, drugs, hormones, and operations. It is well to state at the beginning that no amount of so-called "hygiene" has the least effect on the incidence or severity of pain. Exercise, out-door life, occupation or nutrition leave the woman unimproved when the condition is a true spasmodic dysmenorrhœa.

Drugs.—Anodynes, in the form of aspirin, phenazone, phenacetin only touch the minor cases, but, with adolescents, it is well to begin with these drugs. Soon, however, they cease to have effect. Pethidine, from 50 to 100 mgm., is a useful analgesic for the less severe cases, but it usually causes a "doped" sensation which may last for some hours. Belladonna, as an anti-spasmodic, is sometimes of real value. It may be given as 10 minims of the tincture, or as atropine, 1/100 grain, made up in half an ounce of water.

Hormones.—On theoretical grounds, the sex hormones might be expected to be curative, especially when there is coexisting pelvic hypoplasia. But the clinical results are disappointing. It is stated that if large doses of œstrogen, in the form of diœnœstrol, 0.3 mgm. thrice daily, are taken during the post-menstrual week an anovular cycle is produced, whereby the following period is rendered painless, but otherwise unaltered. Occasionally this method will succeed, but in practice the menstrual cycle may be either shortened or lengthened. On the assumption that the ovarian hormone secretion needs reinforcing, a scheme of treatment may be given as follows:—

During the week after the period—diœnœstrol, 0.3 mgm., daily for seven days; during the

week before the period—antuitrin-S, 200 units, by injection on alternate days, and diencæstrol, 0.1 mgm. daily. This scheme may be modified in dosage if there is either no, or only slight, improvement.

Progesterone and its derivatives have been shown to be capable of sensitizing the uterus to the action of posterior pituitary extract, and thus increasing its contractility. This may account for the frequent failure of this hormone to relieve pain, and sometimes it may even increase it. When the menstrual flow is above the normal it is well to omit all diencæstrol and give antuitrin-S alone during the pre-menstrual week. Some of these patients are abnormally fat. They should be given thyroid extract, one half or more grains daily, until weight has been substantially reduced.

If it is found, as it often is in thin subjects, that there is a marked gain in weight, sometimes up to three pounds during the few days before the period, the indication is water retention due to a high level of secreted oestrogen. The treatment here is to avoid all "œstrols" and give large doses of antuitrin-S during the pre-menstrual week. All hormone treatment is based upon flimsy evidence of the functions of the sex hormones in Man, and it is still largely empirical. Hardly any two gynæcologists employ the same methods in detail.

Surgery.—In those cases in which drugs or hormones fail, the usual step is *dilatation of the cervix*. This again is empirical and can hardly be justified on physiological grounds. However, there are a number of successes following dilatation in nulliparæ, especially, if after passing the last dilator, the ring of the internal os is divided for a quarter of an inch or so (backwards) by inserting a blunt-ended bistoury, and then a tent for twenty-four hours. If dilatation gives substantial relief for a useful length of time, it may be repeated should there be recurrence of pain.

Sympathectomy of the hypogastric plexus at the bifurcation of the aorta and along the common iliac arteries has been done for severe resistant cases. Seldom should it be considered before the age of thirty, for it is followed by uncertain results. Some, however, are undoubtedly cured, and it may be preferable to hysterectomy, according to individual circumstances.

Hysterectomy may be necessary during the later years for intractable pain which causes economic loss, risks the resort to morphine, or leads to secondary neurosis. In carefully selected cases hysterectomy may be strongly indicated as the only method of preventing a form of physical and mental degeneration.

ALECK BOURNE, F.R.C.S., F.R.C.O.G.

THE FEMALE SEX HORMONES

THE normal human ovary undergoes cycles of activity lasting for about twenty-eight days. The main events of each cycle are (1) development of the Graafian follicle, (2) ovulation, and (3) formation of the corpus luteum. The Graafian follicle secretes the hormone responsible for the secondary sex characters. This follicular hormone was formerly referred to as "œstrin"; the generic term "œstrogen" is now more commonly employed. The corpus luteum produces a hormone the chief function of which is to prepare the endometrium for the reception of the fertilized ovum, that is, for the initiation and maintenance of early pregnancy. The hormone is therefore known as "progesterone". The cyclical activity of the ovary is controlled by hormones secreted by the anterior lobe of the pituitary gland; these are consequently described as "gonadotrophic hormones". One of these is especially concerned with the follicular phase of the cycle—the "follicle-stimulating hormone"; the other with the luteal phase—the "luteinizing hormone".

ŒSTROGENS

The follicular hormone, in addition to maintaining the secondary sex characters, is responsible for the growth of the uterine muscle and the proliferative development of its endometrium, and exerts an inhibitory control on the activity of the pituitary. Its chief clinical uses are (1) to relieve the symptoms of the menopause, (2) to induce uterine hæmorrhage in cases of amenorrhœa, (3) to relieve pain in certain selected

cases of spasmodic dysmenorrhœa, (4) to prevent post-partum engorgement of the breasts when breast-feeding is contraindicated, and (5) to allay the symptoms and delay the progress of carcinoma of the prostate.

The true follicular hormone is *œstradiol*. It is administered in the form of injections of *œstradiol benzoate* in doses of 10,000 to 50,000 I.B.U. (international benzoate units). Five injections given twice weekly may induce uterine bleeding in cases of amenorrhœa. Available commercial preparations are *œstroform*, *progynon-B*, *ovocyclin-P* (*œstradiol dipropionate*), *dimenformon* and *benztrone*.

A derivative of this hormone which is found in pregnancy urine is *œstrone*. It is given by mouth. Doses of 3,000 or 6,000 I.U. will generally relieve the symptoms of the menopausal syndrome. Commercial preparations are supplied under the names of *unden*, *œstroform*, *progynon*, *menformon*, *ketodestrin* and *theelin*. These hormones are extracted from animal tissue and are therefore known as "*natural œstrogens*".

Compounds having exactly similar functions have been prepared in the laboratory, and are known as "*synthetic œstrogens*". They are much cheaper and more potent, especially by oral administration, than the natural *œstrogens*. They are, however, apt to induce toxic effects, of which the most common is mild nausea, although sometimes vomiting may occur. Toxic effects depend upon dosage and individual sensitivity. They never occur in pregnant or puerperal women, and seldom in men; they are most frequently seen in menopausal women, who are especially sensitive to *œstrogens*.

Stilbœstrol is probably the most potent of these synthetic *œstrogens*. It is given daily by mouth. In menstrual disorders such as amenorrhœa or dysmenorrhœa fortnightly courses are prescribed of 1, 2 or even 5 mgm. daily. For breast engorgement it may be given in doses of 5 to 15 mgm. daily. For carcinoma of the prostate high doses are also advocated, up to 15 mgm. daily. In menopausal cases, however, dosage should not exceed 1 mgm. daily, and symptoms are often controlled with 0.1 to 0.25 mgm. daily. There is little harm in persisting with such low doses for some weeks or months, although it is important not to use the higher doses in women of child-bearing age for longer than three weeks at a time.

Two other synthetic *œstrogens* are in common use, *hexœstrol* and *dienœstrol*. Both seem to be less likely to induce toxic effects, but *hexœstrol* is certainly much less potent than *stilbœstrol*, and although thorough clinical assays have not yet been conducted with *dienœstrol*, it may prove also to be less effective than *stilbœstrol*.

PROGESTERONE

The corpus luteum hormone renders the tissues temporarily insensitive to *œstrogens*, and completes the development of the endometrium so that it is capable of embedding the fertilized ovum and maintaining pregnancy in the early stages. It is employed in cases in which excessive and sometimes irregular menstrual bleeding is due to constant and unopposed *œstrogen* secretion, as, for instance, when ovulation fails to occur or when there is deficient luteinization. *Metropathia hæmorrhagica* is an example of such conditions. It is also employed to prevent abortion when there is a history of repeated early miscarriages, which are possibly due to deficient development of the decidual endometrium of early pregnancy. For excessive and irregular menstrual bleeding four injections of 10 to 20 mgm. progesterone are given every other day in the premenstrual week or on the first day of bleeding. For habitual abortion 5 mgm. every other day are injected up to the fourth month of pregnancy. An orally active preparation *ethisterone*, may be employed in doses of 30 mgm. daily, but this compound is very expensive. Available commercial preparations of progesterone are: *lutren*, *luteostab*, *progestin*, *proluton*, *lutocyclin*, *gestone* and *lipo-lutin*; and of *ethisterone*: *proluton-C*, *lutocyclin linguets*, *progestoral* and *gestone-oral*.

GNADOTROPHIC HORMONES

For clinical purposes the follicle-stimulating hormone is supplied in the form of an

extract of the serum of pregnant mares, available as antostab, serogan, or gestyl, whereas the luteinizing hormone is extracted from pregnancy urine in such commercial preparations as prolan, gonan, pregnyl and antuitrin-S. These hormones are given by injection and are standardized in international units. Serum gonadotrophin is given in doses of 200 to 3,000 I.U. and chorionic gonadotrophin in doses of 100 to 1,500 I.U. Theoretically these hormones stimulate the ovary to produce œstrogen and progesterone and they are therefore employed in cases of ovarian failure, associated with menstrual disorders, such as amenorrhœa and menorrhagia.

Chorionic gonadotrophin is ineffective in these conditions when given alone, and it is usual to give five injections of serum gonadotrophin, followed by three or four injections of chorionic gonadotrophin. The former is usually given in double the dose of the latter. A combination of an extract of the anterior lobe of the pituitary with chorionic gonadotrophin has been advocated on the grounds that the pituitary extract activates the chorionic gonadotrophin. Commercial preparations are ambinon-B and synapoidin. Up to the present, the results of gonadotrophic therapy have been disappointing.

P. M. F. BISHOP, D.M.

INDICATIONS FOR BLOOD TRANSFUSION

Blood transfusion as a result of the war has, as an art and science, made considerable advances, although the basic theories remain largely the same. By far the most common indications for blood transfusion are (1) acute deficiency of the circulating blood volume and (2) deficiency, acute or chronic, of circulating red cells.

(1) *Acute deficiency of circulating blood volume.*—Whatever the cause of the clinical syndrome of traumatic "shock", there is a grave and increasing deficiency of the circulating blood volume. This may be due either to massive loss of whole blood, loss of plasma alone or a combination of both. Early treatment is essential. When the condition is advanced, recovery is rare. In less advanced cases restoration of the circulating blood volume by a *rapid* transfusion of whole blood or plasma, or both, may be life-saving. It is most important that the quantities given be adequate. Two, three, four or more pints of blood or plasma may be needed. Resuscitation by transfusion should always be combined with the appropriate surgical measures.

(2) *Deficiency of circulating red blood cells.*—When the condition is acute, it is usually the result of hæmorrhage, and restoration of the circulating blood volume is more important than replacement of the red cells. Rapid whole blood transfusion will correct both deficiencies.

THE ANÆMIAS

The chronic deficiency or anæmia may be of widely varied etiology. The anæmias have been classified into (1) those due to hæmorrhage, (2) those due to deficient red cell formation, and (3) those due to increased red cell destruction by hæmolysis.

(1) *Anæmia due to hæmorrhage.*—If the hæmorrhage has stopped and there is no deficiency of circulating blood volume, iron medication is usually all that is required. When the hæmorrhage is chronic and cannot be stopped, and the natural regenerative processes with the help of iron medication cannot correct the anæmia, whole blood transfusion is indicated.

(2) *Anæmia due to deficient red cell formation.*—Some of these anæmias are due to known deficiencies. Idiopathic hypochromic anæmia is due to iron deficiency. Addisonian anæmia is due to the deficiency of the liver principle. Both of these anæmias can be treated rapidly and completely by rectifying the deficiency. Blood transfusion is not indicated unless the anæmia is so grave or complicated by intercurrent disease that there is a danger to life before the deficiency can be rectified.

Aplastic and the other refractory anæmias of unknown etiology can, in the present state of knowledge, be corrected only by appropriate blood transfusion.

Anæmias, secondary to chronic diseases, e.g. tuberculosis and particularly chronic

sepsis, can frequently be treated with markedly beneficial results by blood transfusion. Correction of the anæmia frequently seems to break a vicious circle and therefore to help in the correction of the primary lesion.

(3) *Anæmia due to increased blood destruction by hæmolysis.*—These anæmias are of varied etiology. Blood transfusion is frequently of the greatest value in correcting the effect of hæmolytic crises. In some of the idiopathic hæmolytic anæmias, atypical immune antibodies are present in the patient's plasma. Transfusion has therefore to be given with due circumspection.

Both in the restoration of an acutely deficient blood volume and of deficient red cells, blood stored for up to two or three weeks in a reliable preservative under suitable conditions of refrigeration is little inferior to fresh blood. When there is no particular indication, as in the chronic anæmias, for the administration of the plasma of the whole blood, concentrated red cell suspensions rectify the red cell deficiency in a much smaller volume of transfusion fluid.

In all cases of chronic anæmia there is a danger of overloading, by transfusion, the cardiovascular system which has been weakened by the anæmia. Transfusion should therefore be given at a *slow drip rate* to avoid, so far as possible, this overloading and the consequent heart failure.

THE CHOICE OF BLOOD

Fresh blood is indicated when the transfusion is given for the benefit of the labile elements of whole blood, e.g.:—

(1) *Leucocytes:* Cases of agranulocytosis frequently benefit from blood transfusion, which can, however, supply but few white cells to the patient. A leucocyte cream, obtained from centrifuged fresh whole blood, is theoretically sounder but difficult to obtain in adequate quantities.

(2) *Platelets:* In thrombopenic purpura the platelets from a transfusion of fresh whole blood are often sufficient to raise the patient's platelet count above the threshold of 30,000 to 50,000 per c.mm. The effects are, however, short-lived.

(3) *Prothrombin:* In vitamin K deficiency, notably in chronic obstructive jaundice, hæmorrhages may occur. The prothrombin from a fresh blood transfusion is frequently the quickest way of temporarily correcting this situation.

(4) *Thromboplastin:* In hæmophilulæ there is a globulin deficiency in the patient's plasma. A transfusion of fresh blood (or fresh plasma) can correct this deficiency temporarily, and is valuable in the hæmophilic hæmorrhagic crises.

Universal donor blood was widely and successfully used under war conditions. There is no question, however, but that, ideally, homologous group blood should, whenever possible, be given. It is better for the recipient and it means that by the constant use of all groups of blood far more blood donors are available. This is a point of considerable importance, as nowadays the demand for blood is greater than the supply of donors. Whether universal donor blood or homologous group blood be given, it is *essential* to cross-match the red cells of all donors against the recipient's plasma.

THE Rh FACTOR

In the last few years great strides have been made in the detection and identification of atypical antibodies in serum. These are chiefly antibodies of the Rh system. They should be sought for in any person who has been subjected to the liability of iso-immunization, either by (1) repeated transfusions or (2) pregnancy. They are particularly liable to occur in the so-called Rh-negative persons. No woman under the age of the menopause should be given a whole blood transfusion unless suitable Rh-typed blood has been obtained. If she is Rh-negative, Rh-negative blood only should be used. If she is given Rh-positive blood her chances subsequently of having infants free from erythroblastosis foetalis are greatly diminished.

JOHN F. LOUTIT, B.M., B.Ch., M.R.C.P.

NOTES AND QUERIES

The Post-mortem Estimation of Blood Alcohol

QUESTION.—Is it of any value to estimate the amount of alcohol in the blood *after* death in cases of drunkenness, when death takes place suddenly in a drunken person? If so, for how long after death is such a procedure of value if (a) the body is frozen; (b) the body is kept at average room temperature?

REPLY.—In cases of sudden death, particularly when associated with accidental or homicidal violence, it is frequently of importance to ascertain whether, and to what extent, the deceased was under the influence of alcohol at the time of his death. For this purpose, a sample of blood should be taken at post-mortem examination and subjected to analysis for blood-alcohol estimation without delay. If the sample of blood is taken within two to three days, i.e., within the period during which a post-mortem examination will usually be performed, such an estimation is of definite value. Estimation is made of the volatile reducing substances present in the measured sample of blood by the Widmark method, and at this early stage the method remains fairly specific for alcohol. The figure so obtained can be regarded as a conservative basis for calculating the approximate amount of alcohol present in the body at the time of death. After absorption, alcohol is distributed fairly uniformly throughout the soft tissues of the body, with the exception of the adipose tissues and possibly the skin—that is, throughout a mass of tissue composing roughly two-thirds of the body weight. Thus, for a man of 75 kgm. body weight, a blood alcohol of 0.1 per cent. (i.e. 100 mgm. per cent.) would indicate a consumption of at least $\frac{2}{3} \times 75 \times 10 \times 0.1$, i.e. 50 gm. of ethyl alcohol or 125 c.c.m. of whisky, which is rather less than two "large whiskies". From other circumstances in the case further deductions may be possible with a knowledge of the rate of oxidation in the body, although this is somewhat variable.

With the onset and progress of putrefaction, the interpretation of results becomes progressively more difficult, because the alcohol present in the blood may itself become broken down and, furthermore, the process of putrefaction is characterized by the formation of reducing substances, some of which may be volatile. It will therefore be seen that no definite limits can be placed on the period during which the post-mortem estimation of blood alcohol is of value. When indicated, it should be made, irrespective of the time since death, but the longer the interval since death the more difficult

and the less reliable will the interpretation be. If the body has remained frozen since death or shortly after, that will increase the length of time during which a reliable result can be expected.

PROFESSOR SYDNEY SMITH, M.D.,
F.R.C.P.ED., F.R.S.E.

Facial Twitches

QUESTION.—What is the cause, treatment, and prognosis of an early case of facial spasm? The patient, a woman of thirty-six years, complains of frequent twitching of the right eye brow, and occasionally of the left. On examination there is fibrillation of the muscle of the right lower lid, of which the patient is now conscious. There are no other signs or symptoms.

REPLY (from a neurologist).—The question infers that the patient is suffering from the early stages of a progressive disease. This, however, is not correct. The twitching described is very common, especially in occupations involving prolonged use of the eyes for reading, writing, sewing, and the like. Other muscles are also affected, but the twitching is more noticeable to the patient when it affects the face. Many people develop this when they are tired, and a good holiday is the best cure. There is no reason to suppose that the condition will progress to one of a facial spasm in which *all* the muscles on one side of the face are periodically thrown into a violent and disfiguring contraction. The cause of the condition is not known.

The Treatment of Eczema

QUESTION.—I have a patient just now with eczema which has failed to respond to the use of Unna's paste or calamine and lead lotions. Apart from the eczema the patient is quite healthy. Could you give me any further suggestions for treatment?

REPLY.—In the treatment of eczema it should always be remembered that the cutaneous manifestations are merely symptoms, and that to attempt to cure these symptoms without removing the cause is to invite failure. The briefest definition of eczema is that it is a reaction of the epidermis to an exogenous or to an endogenous antigen. If occlusive dressings with Unna's paste have failed to cause improvement, there is *prima facie* evidence to suggest that the eruption is endogenous in origin, and, although the patient is perfectly healthy, it would be wise to re-examine him to determine

whether or not he has any focus of infection from which toxins are being absorbed. The condition of the sinuses, antra, ears, nasopharynx, gums, and alimentary tract, should be considered from this point of view. The state of the gall-bladder should never be overlooked. Abnormal carbohydrate metabolism may be associated with eczema, and examination of the urine followed, if necessary, by a glucose tolerance test, may be advisable. Scrutiny of the diet with a view to determining whether any particular food or beverage causes exacerbation of the eruption sometimes yields satisfactory information.

Despite the *prima facie* evidence suggesting an endogenous origin of the malady, the possibility of an exogenous cause may be worth consideration. Sensitization to relatively harmless agents, such as soap and washing soda, the many cleansing agents at present on the market, insect powders and the numerous chemicals used by gardeners, or the chemicals to which a patient may be exposed in the course of his work or his hobbies, should be considered. It is extraordinary how often at consultation patients will deny that they are exposed to any possibly deleterious dusts or liquids, and then remember when they return home that they have been exposed for some time to, for example, powder used to destroy insects, chemicals used in photography, and the like. It is worth remembering that chronic tinea between the toes may be associated with eczematous eruptions elsewhere, and that some patients are unduly sensitive to sunlight and, at this time of year particularly, to flowers.

For immediate therapy, benefit may accrue from the empirical use of (1) 1 per cent. aqueous solution of silver nitrate, if there is much oozing; (2) 1 per cent. aqueous solution of aluminium acetate, if the lesions are slightly oozing; (3) Lassar's paste with 1 per cent. ichthammol and 3 per cent. liquor picis carbonis, if the lesions are dry. If either of the lotions is used, it should be applied as gauze soaks, and oil silk (or similar occlusive) and cotton-wool should

not be incorporated in the dressing. If the past is employed it should be spread directly on the skin, "until the integument looks like well-buttered piece of bread", and covered with unmedicated gauze and a bandage.

Many patients derive benefit from the administration of a simple mixture containing 1 grain of quinine sulphate and 8 grains of magnesium sulphate, thrice daily. If the quinine is not available, magnesium sulphate in small doses thrice daily is often beneficial. The discomfort caused by the eruption causes more suffering than is usually recognized. Therefore suitable sedatives should not be withheld of these, phenobarbitone ($\frac{1}{2}$ grain *mane*, grain *nocte*) is useful, provided the patient has not been sensitized to the drug.

R. M. B. MACKENNA, M.D., F.R.C.P.

The Cleaning of Used Corks

QUESTION.—Is there any method available to clean and renovate used corks? Patients are returning empty medicine bottles and corks during the present acute shortage. The empty bottles are easily utilized again, but I find I have to discard the corks, which are darkened from the mixture, and finger grease and dirt.

REPLY.—No really satisfactory method of cleaning used corks is available. Admittedly corks are in short supply, but used corks especially from bottles which have contained a mixture prepared with a vegetable infusion, are frequently infected with moulds and fungi. They can only be cleaned by such measures as boiling with a bleaching agent, such as sodium hypochlorite or chlorinated lime. Boiling will, of course, make the corks swell and they will probably become useless. Greasy corks would require treatment with soap and water before being bleached. My advice is to anticipate the provisions of the New Health Service and tell patients to take their prescriptions to a pharmacist who will fit fresh corks to the bottles.

W. K. FITCH

Editor, *Pharmaceutical Journal*.

PRACTICAL NOTES

Diurnal Variation in Hæmoglobin

WHILE it has for long been known that appreciable variations in the number of circulating red blood cells and hæmoglobin occur in health, there has been a considerable divergence of opinion as to the extent, and the cause, of these variations. As a result of investigations carried out on 41 patients, A. W. Branwood (*Edinburgh Medical Journal*, March 1946, 53, 125) has shown that one of the factors concerned is the

ingestion of food. He estimated the hæmoglobin at hourly intervals from 10 a.m. to 4 p.m., and the patients had the usual hospital dinner (488 calories) at 1 p.m. No other food or fluid was allowed during the period of investigation. In every case the hæmoglobin before the meal did not exceed a variation of 2 per cent. The findings following the meal could be divided into two groups. In 34 cases there was a fall in the hæmoglobin amounting to 8 or 10 per cent.,

the difference between the mean values before and after the meal being 6.4 per cent. The lowest level of hæmoglobin was obtained one-and-a-half hours after the meal. In the remaining seven patients, five of whom had hypertension and two hyperthyroidism, the hæmoglobin rose after the meal. The fall in hæmoglobin did not occur if the patient was not given any food, and its extent appeared to be related to the size of the meal. Exercise or the administration of adrenaline prevented any fall. The probable cause of this fall is thought to be a redistribution of the red cells from the periphery to the abdominal viscera, and possibly also to slight changes in blood volume. This last hypothesis is supported by the presence in the patients with post-prandial rise in hæmoglobin, of hypertension or hyperthyroidism, conditions in which the circulatory system is involved. The practical implication of these findings is that when periodic hæmoglobin values are required, the estimations should not be made within three hours of a large meal, or alternatively that they should always be made at the same time of day.

Cleansing the Auditory Canal

For cleansing the external auditory canal and removing cerumen, R. P. Little (*Archives of Dermatology and Syphilology*, January 1946, 3, 19) recommends the following mixture:—

Sulphated vegetable oils	25 per cent.
Liquid petrolatum	25 per cent.
Water	50 per cent.

This mixture not only softens cerumen and so helps in its removal, but it may also be added to the water used for syringing the ear. The sulphated oils are less irritant than soap because of their relatively low pH and the fact that they contain no saturated fatty acids of low molecular weight. They clean satisfactorily because of their ability to emulsify and suspend the oils on the skin. Little has also found this mixture of value in the cleaning of eczematous auditory canals and in the prophylaxis and cleansing of infectious eczematoid dermatitis due to a crumble in the auditory canal.

Penicillin in Sulphonamide-resistant Gonorrhœa

SUCCESSFUL results from the use of penicillin in the treatment of sulphonamide-resistant gonorrhœa are reported by G. W. Imirisch (*Journal of Urology*, March 1946, 55, 306). Of 483 cases of gonorrhœa treated at an army hospital, 283 (58.6 per cent.) proved to be resistant to a five-days' course of sulphonamides. These resistant patients were given 600,000 units of penicillin in twelve hours:

20,000 units being injected intramuscularly into the upper outer quadrant of the buttocks every three hours for five doses. Following this course of treatment, smears became negative in 271 (95.8 per cent.) cases. Of the twelve patients who did not respond to this dosage, six cleared up following an additional 100,000 units, five responded to a total dosage of 300,000 units, and one required 400,000 units. Further confirmation of the successful use of penicillin in sulphonamide-resistant gonorrhœa comes from R. Lees (*Brit. med. J.*, April 20, 1946, 1, 605), who records the results obtained in three series of cases. In the first series, which comprised 1,737 cases, the cure rate was 93.9 per cent., the highest percentage of cures being obtained by the use of penicillin in total dosage of 100,000 units, divided into ten doses of 10,000 units, given at three-hourly intervals by the intramuscular route. In a second series of 204 cases the same total dosage was employed and equally good results were obtained by the administration of five injections of 20,000 units at three-hourly intervals. In a third series, the trial of administering the same total dosage in four injections of 25,000 units at four-hourly intervals did not produce such good results, the cure rate being only 92 per cent. As regards comparison of effective dosage, a cure rate of 98 per cent. was obtained with a total dose of 100,000 units, and 94.3 per cent. patients were cured with a total dose of 60,000, but with total doses of 50,000 and 30,000 units the cure rates were only 92 and 80 per cent. respectively.

The Effect of Pasteurization upon the Vitamin Content of Milk

THE controversy on the subject of the effect of pasteurization upon the nutritive value of milk having been revived recently, the following points culled from a review of the subject by M. Schofield (*Food Manufacture*, March 1, 1946, 21, 120) are of interest. **Vitamin A:** Pasteurization has no effect upon the vitamin A content of milk. Even boiling the milk does not affect this vitamin, nor is it affected by complete dehydration or the process used in producing condensed milk. **Vitamin B:** The B₁ fraction is definitely affected by pasteurization, but B₂, nicotinic acid and riboflavin are unaffected. The evidence concerning the B₂ content is conflicting, some workers reporting no loss whilst others report some loss. In sweetened condensed milk there is a 5 to 10 per cent. loss of B₁. **Vitamin C:** A definite loss of this vitamin, amounting to 20 to 30 per cent., occurs on pasteurization, but a point which is often overlooked is that considerable loss occurs in raw milk on exposure to light. Even in fresh milk

of high grade produced under excellent feeding and management conditions the presence of vitamin C in reasonable amounts cannot be guaranteed. Sweetened condensed milk shows a 15 per cent. loss of this vitamin, whilst unsweetened and evaporated milk sterilized after concentration show a 60 per cent. loss. Because of the removal of fat, dried skim milk has a higher proportion of vitamins B and C than full cream milk. Vitamin D is unaffected by pasteurization.

Prickly Heat

ACCORDING to F. R. Fry and E. Susman, of the Royal Australian Naval Reserve (*Medical Journal of Australia*, December 22, 1945, 32, 453) prickly heat is "an annoyance rather than a disease". Diagnosis is easy. The rash practically always appears on the shoulders and upper part of the arms, although it may also occur on the back, under the wrist strap and around the waist, i.e., where the moist sweaty clothes adhere to the skin. It is always dimorphic: small red papules and tiny vesicles that feel like "sago grains in miniature". The only complaint is of pricking, tingling sensations in the affected area. Itching is unusual, "the eruption being vexatious rather than irritating". The authors have never seen a superadded infection or a scratch dermatitis. The victim tends to rub or stroke the affected area with the palm of the hand, but the finger-nails are never used to scratch. There are neither constitutional manifestations of the disorder nor complications. As a result of an investigation of forty-six naval officers serving at sea under war-time conditions, the following factors were found to increase the tendency to prickly heat: age over thirty years; fair skin; "highly strung" type of individual; large salt intake; working and sleeping between decks; high temperature of place of work; long working hours; poorly ventilated clothing. The factors that were found to have no effect on the condition were: weight; reaction of the sweat; wearing of open-necked shirts; effects of the sun on the patient's skin. There is no certain prophylaxis, and treatment is merely palliative; either calamine lotion or some cooling lotion containing spirit. The authors sum up treatment in these words: "in the matter of treatment, a healthy stoicism towards a minor ill is the correct attitude to adopt".

Streptomycin Aerosol in Chronic Bronchiectasis

FOLLOWING successful results obtained at the Mayo Clinic by the use of nebulized penicillin in the treatment of bronchiectasis, by which

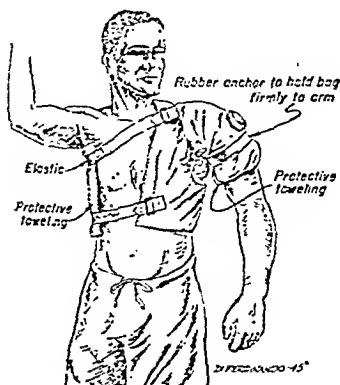
improvement resulted in 50 per cent. of cases and a 75 per cent. reduction in the volume of sputum was observed, A. M. Olsen (*Proceedings of the Staff Meetings of the Mayo Clinic*, February 6, 1946, 21, 53) records the use of streptomycin aerosol in cases in which penicillin aerosol proved ineffective owing to the presence of penicillin-resistant gram-negative organisms. The report, which is preliminary one, concerns nine cases in which the penicillin aerosol had been used for some time without producing the desired reduction in sputum volume. Smears and cultures showed that although gram-positive bacteria had been successfully eradicated, numerous gram-negative bacteria were present which were shown to be sensitive to streptomycin tests carried out *in vitro*. 500,000 units of streptomycin, dissolved in 20 c.c.m. of physiological saline, were nebulized each day, and some instances 200,000 units of penicillin were combined with 500,000 units (0.5 gm.) of streptomycin, in either 20 or 30 c.c.m. of saline solution. For nebulization therapy, penicillin sodium and streptomycin hydrochloride can be combined satisfactorily. In each of the nine cases in which streptomycin aerosol was employed there was rapid disappearance of the gram-negative bacteria from the pulmonary secretions with almost immediate reduction of sputum volume, and the remaining sputum became non-purulent. None of the patients became entirely sputum-free, however. It is stated that as a preparation for pulmonary resection in bronchiectasis, penicillin and streptomycin aerosols have definite value in those patients with non-surgical bronchiectasis the nebulization therapy is effective in producing temporary reduction of pulmonary secretion, but if such benefits are to be retained treatment on a modified scale would probably have to be continued at home.

Chilling Penicillin

ONE of the major problems at the moment is the use of penicillin is how to prolong its effect. As a result of their experience with 10 cases of gonorrhoea, M. Trummer and G. Thompson of the U.S.N.R. (*Journal of the American Medical Association*, March 9, 1946, 130, 627) recommend chilling the site of injection. Their technique was as follows:—

Two hours before the injection of penicillin a circular ice-bag of about 80 ounce capacity was 90 per cent. filled with crushed ice. Before closing the bag it was squeezed to drive out all excess of air, a process which was repeated an hour later, to ensure that the bag could be moulded round the deltoid muscle. When first filled the bag was fitted to the upper arm and shoulder, as shown in the accompanying sketch. A half-vest was secured by two belts, and the ice-bag was fastened by a cloth holder strapped on to the vest so that it could be removed readily. An elastic strap fastened the ice-bag holder securely to

upper arm, and two small tapes tied the holder to the . . . When the ice-bag had been in position for two hours, bottle of penicillin (100,000 units in 10 c.cm. of) was chilled for at least five minutes and then injected with a $\frac{1}{2}$ -inch hypodermic needle into the old muscle. The ice-bag was immediately replaced retained for twelve hours, the ice being renewed every hours as required.



taking as a standard of cure the obtaining of negative smear and culture of prostatic secretion. Forty-eight hours after the cessation of charge, the following results were obtained:— 12 patients receiving 50,000 units of penicillin, 3 per cent. were cured; of 35 receiving 100,000 units, 85.7 per cent. were cured, whilst 45 receiving 100,000 units, 90.7 per cent. were cured. This last figure compares favourably with the results obtained with multiple injections and with a single injection of 100,000 units in a mixture of beeswax and peanut oil. It therefore concluded that "the chilling unique prolonged the effective action of penicillin, reduced to one the number of injections required to treat uncomplicated gonorrhoea and rendered that injection painless".

Potassium Iodide as an Expectorant

CANADIAN workers (E. M. Boyd *et al*, *Canadian Journal of Research*, December 1945, 23,) have now produced experimental evidence which would appear to settle the long-standing controversy as to whether iodides have an expectorant action and the means whereby this action is mediated. Using a standardized technique for measuring the respiratory tract fluid, they investigated in some 300 to 400 bits and cats the action of (a) inorganic iodides, (b) iodized proteins, (c) iodized fats, (d) acids and oils, and (e) organic iodide substitutes. When given by stomach tube, both potassium iodide and the "organic iodide substitutes" produced an increased volume of respiratory tract fluid: potassium iodide, for

instance, in a dose of 0.1 gm. per kgm. of body weight caused a 25 to 50 per cent. increase in the output of respiratory tract fluid. The iodides included in groups (a) and (b) had a negligible effect. In a series of cats, in which the afferent gastric nerves had been severed, the administration of potassium iodide in doses which in the intact animal augmented the production of respiratory fluid, had no significant effect upon the volume of respiratory tract fluid. In other words, the expectorant action of potassium iodide is mediated through a reflex via the vagus and originating in the stomach. No evidence was obtained to suggest that the expectorant action of iodides was due to a direct effect upon the bronchial glands, even though, following the oral administration of potassium iodide, a marked increase in the concentration of iodine-containing substances was noted in the respiratory fluid. It is pointed out that, although this excess of iodine-containing substances in the respiratory tract fluid might be responsible for the decreased tenacity of the fluid which has been noted by some workers following the administration of potassium iodide, such a lessening of the viscosity might just as well be due to a simple increase in the volume of the respiratory tract fluid.

Penicillin in Oil Suspension

Using a suspension prepared by the head pharmacist of Salpêtrière, which involved the following technique—

a solution of 3 per cent. lanoline in neutralized olive oil is sterilized for half an hour at 120°; the penicillin is pulverized in a sterile mortar, cooled in an ice bath, and then gradually added to the oil in the strength of 100,000 units per 5 c.cm. excipient (the suspension, which is stored in sterilized ampoules and kept in a refrigerator, is stable),

L. Leger (*Presse Médicale*, April 6, 1946, 54, 210) reports on the results obtained in the treatment of several cases of gonorrhoea by the use of the oil suspension. It was found that the infection reacted definitely and rapidly, the action being as rapid and as effective as when aqueous solutions of penicillin were employed. Similar results were obtained in cases of anthrax. In one case, in which treatment with aqueous solution of penicillin had to be interrupted because of anaphylactic reactions, in the form of urticaria and oedema, it was found possible to carry out the treatment to its conclusion by the use of the oil suspension. The advantages claimed for the use of the oil suspension are (1) that it renders possible ambulatory penicillin therapy, and (2), owing to its slow rate of absorption, a single daily dose of oil suspension is sufficient and possesses the same potency as the aqueous solution which has to be administered in divided and repeated doses.

REVIEWS OF BOOKS

Principles and Practices of Inhalational Therapy. By ALVAN L. BARACH, M.D. Oxford: Blackwell Scientific Publications Ltd., 1945. Pp. xvi and 315. Illustrations 59. Price 25s.

INHALATIONAL therapy as dealt with in this book is defined as "the administration of oxygen, helium, carbon dioxide, positive pressure, alternating and equalizing pressure, and the vaporized solutions of various drugs such as epinephrine, neosynephrin, and some of the sulphonamides". The greater part of the book, however, is concerned with the therapeutic use of oxygen. Written by one who has had much clinical experience of this form of treatment, the book is essentially practical in outlook, but at the same time deals with the underlying physiological principles. A series of chapters are devoted to consideration of the various conditions in which inhalational therapy has been used, ranging from hiccup and migraine to pneumonia and compressed-air illness. The technical side is also adequately covered, particularly in the long chapter dealing with methods of inhalational therapy. Obviously an enthusiast for this form of treatment, the author yet succeeds in maintaining a reasonable sense of balance in presenting the subject, although he does not devote sufficient attention to the risks attached to the prolonged use of 100 per cent. oxygen. Provided the reader constantly bears in mind that oxygen therapy, valuable as it often is, is merely part of the treatment required in any given case, this book will subserve a useful function in drawing attention to the vital rôle so often played by oxygen in the treatment of disease.

Essentials of Clinical Allergy. By SAMUEL J. TAUB, M.D. Baltimore: The Williams & Wilkins Co., 1945; London: Baillière Tindall and Cox Ltd., 1946. Pp. x and 198. Figures 2. Plates 16. Price 16s. 6d.

THIS admirable little book fulfils the promise of its title, and gives a concise account of the allergic diseases from the practical, clinical standpoint. It avoids the pitfalls of too much theoretical discussion on the one hand, and too many case histories on the other. Special attention is given to diagnosis and treatment, including details of the preparation of skin test extracts, special diets, and the like. The opening sentence of the book—"A broad general

knowledge of internal medicine is the first essential to the diagnosis and evaluation of the allergic patient"—emphasizes a principle which many writers on allergy seem to have forgotten and gives the key-note of its quality. Definitely to be recommended to the post-graduate student and to the general practitioner, and a book which many allergists might read with profit.

Anatomical Atlas of Orthopaedic Operations By L. S. MICHAELIS, M.D. London William Heinemann (Medical Books Ltd., 1946. Pp. 67. Figures 73. Price 25s.

WITH its concise technical details and the excellent accompanying illustrations this book should make a strong appeal to all those interested in orthopaedic surgery. The work is based on experience gained in the operating theatre, and some of the sketches have been made by the artist in the theatre. The author is to be congratulated on a work of practical value and unique conception, and the publishers on the excellent production.

Demonstrations of Operative Surgery for Nurses. By HAMILTON BAILEY, F.R.C.S. Edinburgh: E. & S. Livingstone Ltd., 1946. Pp. 348. Figures 531. Price 21s.

THIS book gives a clear and illustrated account of the principles and technique of some of the more important standard operations of surgery. A large number of contributors has been enlisted by the principal author, so that each operation is described by an expert. (One technique only is described). Apart from the operations there are preliminary chapters on surgical instruments, management of the operating table, sterilizing, and ligatures and swabs. The general production and illustrations are of the high order that it is customary to associate with the author and publishers. This book should prove most valuable to the nurse during the course of her theatre training. Its principal function should be to enable her to follow intelligently the common operations she will see performed. It is hoped that it will be used as a book of reference by nurses and not as "just another textbook". Apart from nurses, the book should also be valuable as an introduction to operative surgery for medical students at the time when they are doing their ward and theatre work.

NEW EDITIONS

A NEW chapter on penicillin therapy, rewriting of the sections on venereal diseases and diseases of the thyroid gland, and extensive revision of the chapter on diseases of the respiratory system, are features of interest in the fourth edition of *Textbook of Medical Treatment*, edited by D. M. DUNLOP, M.D., F.R.C.P., L. S. P. DAVIDSON, M.D., F.R.C.P., and J. W. MCNEE, D.S.O., D.Sc., M.D., F.R.C.P. (E. & S. Livingstone Ltd., 30s.), as is also a short section dealing with the new parasiticide and insecticide D.D.T. In spite of the fact that only two years have elapsed since the appearance of the previous edition a number of advances in medicine have occurred during that period; these have been incorporated. The editors and publishers are to be congratulated on the new format adopted for the new edition, which is assured of a warm welcome.

THE second edition of *Textbook of Neuro-pathology*, by ARTHUR WEIL, M.D. (William Heinemann (Medical Books) Ltd., 25s.), incorporates much of the recent experimental work on the production of tumours of nervous tissue and the pathology of the various forms of shock therapy used in the treatment of mental disease. Neuropathology is one of the more complex branches of pathology, and this book subserves a particularly useful function in presenting a clear and reasonably straightforward description of the changes that occur in the central nervous system as a result of infection, intoxications, degenerative disease, cerebro-vascular disease, and tumours. There is a useful appendix dealing with the different methods of fixing and staining sections. The bibliography contains few references to British contributions to the subject. One serious criticism of the book is that in no case is any indication given as to the magnification of the numerous microphotographs illustrating the book.

A *Practical Handbook of Midwifery and Gynaecology*, by W. F. T. HAULTAIN, O.B.E., M.C., M.B., B.Ch., F.R.C.P.E.D., F.R.C.S.ED., F.R.C.O.G., and CLIFFORD KENNEDY, M.B., Ch.B., F.R.C.S.ED., F.R.C.O.G., in its third edition (E. & S. Livingstone Ltd., 20s.) has been largely rewritten and brought up to date in all sections. Much new material has been added, including an entirely new chapter on "the infant". Among the new sections is one on the therapeutic use of hormones and another on the use of X-rays in obstetrics and gynaecology. Some new illustrations have also been added.

THE special attention devoted to malaria, yellow fever and nutritional diseases in the twelfth edition of *Manson's Tropical Diseases*,

edited by SIR PHILIP H. MANSON-BAHR, C.M.G., D.S.O., M.D., D.T.M. and H., F.R.C.P. (Cassell and Company Ltd. 42s.) will be found particularly welcome in this early post-war period. Other features of outstanding interest are a chapter on the technique of injections and blood transfusion for use in tropical countries, and a table of drugs, with their formulae, indications for use and dosage, for the treatment of tropical diseases. Advances in the treatment of leprosy have also been included in the new edition, which is well produced and generously illustrated.

A CONSIDERABLE amount of new material has been added to *Leprosy*, by SIR LEONARD ROGERS, K.C.S.I., C.I.E., M.D., F.R.C.P., F.R.C.S., F.R.S., I.M.S., and ERNEST MUIR, C.I.E., M.D., F.R.C.S.ED., in its third edition (John Wright & Sons Ltd., 25s.) and new advances in treatment which have developed during the past six years have been included. It is a grim thought that improvement in transport by air, sea and road, with the consequent bringing into closer contact of people of different races and social levels, may bring in its wake increased danger of the transmission of leprosy, and for this reason measures for the control of the disease become of increasing importance. The new edition of this well-known treatise will be particularly welcome.

Textbook of Public Health, by W. M. FRAZER, O.B.E., M.D., Ch.B., M.Sc., D.P.H., and C. O. STALLYBRASS, M.D., Ch.B., D.P.H., in its eleventh edition (E. & S. Livingstone Ltd. 25s.) has been extensively revised in the light of the many changes that have taken place in medicine and public health during the six years that have elapsed since the appearance of the previous edition. A new chapter on the Social Services has been included, and a separate chapter has been allocated to the venereal diseases. The work covers the ground for both the certificate and the Diploma of Public Health. The new edition should prove of much value to both medical students and practitioners.

A *Pocket Surgery*, by P. H. MITCHNER, C.B., C.B.E., T.D., M.D., M.S., F.R.C.S., D.Ch., and A. HEDLEY WHYTE, D.S.O., T.D., M.B., M.S., F.R.C.S., in its second edition (J. & A. Churchill Ltd., 8s. 6d.) will, as the authors suggest in their preface, be particularly welcome to the general practitioner returning to civilian practice from the Forces. In spite of its small compass, which incidentally is one of its chief attractions, this little book adequately covers the clinical features, surgical technique and treatment of the various surgical injuries and diseases met with in general practice.

NOTES AND PREPARATIONS

NEW PREPARATIONS

PENTAMIDINE ISETHIONATE M. & B.—On the basis of clinical evidence this preparation is stated to be one of the least toxic of the aromatic diamidine compounds. Its use as a chemotherapeutic agent is indicated in the treatment of early *Trypanosoma gambiense* infection and in kala-azar. The manufacturers are Pharmaceutical Specialities (May & Baker) Ltd., Dagenham, Essex, by whom the preparation is issued in the form of a 10 per cent. solution for intramuscular injection. Literature is available on application.

'SKETOFAX' brand **LIQUID INSECT REPELLENT** is a clear, faintly perfumed preparation suitable for application to the face and other exposed parts of the body. Its production is the result of intensive research during the war, and it is claimed that effective and prolonged protection against gnats, mosquitoes, flies and other winged pests can be obtained by its use. 'Sketofax' is also available in the form of a cream. The manufacturers are Burroughs Wellcome & Co., 183-193 Euston Road, London, N.W.1.

A CENTENARY PUBLICATION

MESSRS. H. K. LEWIS & CO. LTD., the well-known medical publishers and booksellers, celebrated their centenary in 1944. War conditions prevented the publication at the time of the booklet which had been prepared to mark the occasion, but this has now been published. It provides a short history of the firm from its beginning at 15 Gower Street North to the present day. Many distinguished names, such as those of Sydney Ringer and Sir Thomas Barlow, figure in this record of steady progress and unflinching service to successive generations of medical students and practitioners. The book, which can be obtained free of charge on application to the publishers at 136 Gower Street, London, W.C.1, is elegantly produced and freely illustrated. It is written in a pleasantly discursive style and provides an interesting sidelight on the medical history of the last hundred years.

MEDICAL FILMS

A VOLUNTARY scheme of cooperation, which in main covers the question of possible overlapping of medical subjects for film production, has been inaugurated by the Scientific Film Association. Recent films of medical interest produced by S. F. A. include one on the story of D.D.T. and a series on the technique of anaesthesia. Inquiries relating to the scheme should be addressed to the Hon. Secretary,

Medical Committee, Scientific Film Association, c/o the Royal Society of Medicine, 1 Wimpole Street, London, W.1. An attractive addition to the *March of Time* series (no. 6—11th year) is a film entitled "Life with Baby", based on observations at the Yale University's Clinic of Child Development. Among recent issues by the Federation of Documentary Film Units are "Penicillin: Its Discovery and Uses", and "Six Little Jungle Boys", a cartoon film on tropical diseases.

THE NATIONAL HEALTH BILL

WITH commendable initiative (and speed) the Editors of *The British Encyclopædia of Medical Practice* have published a special interim supplement on the National Health Services Bill (published at 5s. by Butterworth & Co. (Publishers) Ltd., Bell Yard, Temple Bar, London). This is written by Dr. W. Montagu Levitt and provides, in the author's own words, "an objective and completely unbiased account of the Bill". Dr. Levitt is to be congratulated upon the skill with which he has translated the terms of the Bill into language which can be easily understood. Of the objectivity of his account there can be no doubt, and the practitioner will find this supplement of invaluable help in understanding what the future holds for him when the Bill becomes law.

OFFICIAL NOTICES

An Experimental Study on Rationing is no. 254 of the Special Report Series of the Medical Research Council and, as its title indicates, gives full details of an investigation undertaken to determine the effect on health of drastic food rationing. The Report is published by H.M. Stationery Office, price 1s. *Penicillin*—New Regulations have replaced those issued in August, 1944; they provide for an increased standard of purity for penicillin preparations used for parenteral administration and an increase in the minimum potency to 300 units per mgm. for preparations in solid form and to 2000 units per c.cm. for solutions.

GYPSONA

IN order to avoid unnecessary confusion, the manufacturers of Cellona plaster of Paris bandages, T. J. Smith & Nephew Ltd., Chandos House, Palmer Street, London, S.W.1, have decided to adopt for general use the name of "Gypsona", by which the cellona technique is known in non-British territories.

The contents for the July issue will be found on page 149 at the end of the advertisement section.

PENICILLIN

IN GENERAL PRACTICE

As from June 1 the free issue of penicillin by the Ministry of Supply through the hospitals of the country will cease, and penicillin will be on sale to the public against a doctor's prescription. This welcome step has been rendered possible as the result of the tremendous increase in the output of penicillin during the last year. In 1945, for instance, the average monthly production in this country was 300 mega units (a mega unit = 1,000,000 international units), but by April of this year it had increased to over 260,000 mega units. A further factor responsible for this increased production is the increase in potency of penicillin from 150 units per mgm. to about 1,000 units per mgm.

The literature covering penicillin is now so vast that it is difficult to keep pace with it, and it has therefore been felt that a brief résumé of the present position would be of interest to practitioners now that, for the first time, they are free to prescribe penicillin for their patients.

PREPARATIONS OF PENICILLIN AVAILABLE

Initially most of the penicillin will be available in the form of a dried product which will be supplied in vials or ampoules containing 0.1, 0.2, 0.5, and 1.0 mega units. The maximum retail price of these vials will be 2s. 9d., 4s. 9d., 10s. 6d. and 20s. respectively. In addition, penicillin will also be available in an oil-wax suspension for injection. A certain amount of penicillin has been made available to pharmaceutical chemists for the purpose of making other preparations of penicillin, and in the first instance most of this will be used for making lozenges, each of which will contain 500 units of penicillin. To begin with, pharmaceutical chemists are not to be allowed to manufacture penicillin cream, but sterile cream bases will still be available from which the dispensing chemist will be able to make up a penicillin ointment.

PROPERTIES OF PENICILLIN

The principles underlying the effective therapeutic use of penicillin are simple and straightforward provided certain properties of the drug are always borne in mind.

(1) Although the experts have not yet provided a full answer to the question whether penicillin is bacteriostatic or bactericidal, there is little doubt that in the doses given clinically it is mainly *bacteriostatic* and exerts its action upon the actively growing organism. This means that unless an adequate level is maintained in the blood for several days, some organisms may survive, and if the administration of penicillin is stopped too soon these organisms may multiply and cause a recurrence of the infection. The level at which penicillin should be maintained in the blood is 0.1 units per c.cm. for streptococcal and gonococcal infections and 0.3 units for *staphylococcus aureus* and *streptococcus viridans* infection.

(2) Penicillin is freely soluble in water and diffuses readily. This means that it is rapidly absorbed after subcutaneous or intramuscular injection or after local application to a wound. The speed with which it is absorbed can be judged from the fact that maximum concentration in the blood is attained within fifteen minutes of intramuscular injection. In other words, except in dangerously ill patients, there is no need to give penicillin intravenously.

(3) Penicillin is rapidly excreted in the urine. The practical implication here is that, in order to maintain an adequate blood level, penicillin should be given at frequent intervals throughout the twenty-four hours. The usual method is to give it every three hours.

(4) The meninges and serous membranes are relatively impermeable to penicillin, so that in meningitis, for instance, penicillin must be given intrathecally.

(5) Penicillin is destroyed by acids and alkalis, which explains why it is relatively ineffective when given by mouth.

(6) Penicillin is destroyed by boiling, so that sterilization by boiling or autoclaving is impracticable.

(7) Penicillin is destroyed by the enzymes of many bacteria, such as *B. coli*. In other words, when penicillin is contaminated it rapidly loses its potency. This is the reason why such care should be exercised in the preparation of penicillin ointment or solutions of penicillin.

(8) The potency of penicillin diminishes rapidly on exposure to moisture. Solutions, or other preparations, of penicillin exposed to air or kept at room temperature will not deteriorate significantly in twenty-four hours, but they should not be kept for more than forty-eight hours. This is a point of considerable importance in the use of penicillin lozenges. The bottles or tubes in which they are packed by the manufacturers are dried with extreme care, and if the lozenges are to maintain their potency it is essential that the cap of the bottle should be tightly screwed on immediately after it has been opened for the removal of a lozenge.

(9) The action of penicillin, unlike that of the sulphonamides, is not inhibited by pus or serum, but the presence of much dead or avascular tissue may hinder the permeation of penicillin and thereby diminish its efficiency. In other words, penicillin is not a substitute for surgery in infected wounds, but in combination with surgery it provides one of the most lethal weapons for the control of infection.

INDICATIONS FOR PENICILLIN

In deciding whether penicillin is indicated in any particular condition the main consideration is the susceptibility of the causative organism. Thus a bacteriological diagnosis is essential, but the need for such a diagnosis should not lead to the withholding of penicillin in seriously ill patients. If there is any good clinical evidence that the condition is due to a penicillin-sensitive organism and it is felt that the patient's life might be endangered by delay in administering penicillin, then a specimen should be taken for bacteriological investigation and penicillin then given pending completion of the diagnosis.

Among the organisms susceptible to penicillin are:—

<i>Gonococcus</i>	<i>C. diphtheria</i>
<i>Pneumococcus</i>	Clostridia of gas gangrene
<i>Staphylococcus aureus</i>	Spirochaetes of syphilis and relapsing fever; possibly of Weil's disease
<i>Streptococcus pyogenes</i>	Actinomyces
<i>B. anthracis</i>	

Among the pathogenic organisms which are not susceptible to penicillin are:—

<i>B. coli</i>	Acne bacillus
<i>M. tuberculosis</i>	Most viruses
<i>B. Proteus</i>	Occasional strains of <i>staphylococcus</i> and <i>streptococcus</i>
<i>Ps. pyocyanea</i>	
<i>Streptococcus faecalis</i>	

As has already been mentioned, penicillin is now available in four forms: a powder, an oil-wax suspension, a lozenge, and a cream. The use of these preparations can best be considered under the headings of systemic and local administration.

SYSTEMIC ADMINISTRATION

This may be either intramuscular or intravenous.

Intramuscular. The usual dose of 15,000 units is conveniently given diluted in 2 c.cm. of sterile pyrogen-free water, the water being added to the powder in the ampoule and then drawn into the syringe. The drawback to this method of administration is that it may ultimately prove very painful. Should this occur it is advisable to change to a continuous intramuscular or intravenous drip administration, or alternatively to add to the penicillin solution, immediately prior to injection, sufficient procaine to give a concentration of 0.5 to 1 per cent. of procaine.

If it is decided to use a continuous intramuscular drip, the requisite amount of penicillin for twenty-four hours (100,000 to 120,000 units) is given in a pint of fluid. Rigid aseptic precautions must be observed. The main disadvantage of this method is the tendency for local oedema to occur, but this may be prevented by using one of the many methods that have been described (e.g. *The Practitioner*, January 1946, p. 76), whereby as small a volume as 100 c.cm. can be delivered in the twenty-four hours.

Intravenous. Continuous infusion by the intravenous drip method is given by dissolving the daily requirement of penicillin (100,000 to 120,000 units) in 2 to 3 pints of sterile saline. The disadvantage of this method is the high incidence of thrombosis.

On account of the rapid rate of absorption of penicillin the intramuscular route is satisfactory in the majority of cases and it is only necessary to resort to the intravenous route when the state of the patient clearly demands that the full bacteriostatic effect of the penicillin should be obtained as quickly as possible.

Penicillin in oil-wax suspension. The advantage of this preparation, which is given intramuscularly, is that it slows the rate of absorption of penicillin, so that with one injection a reasonable blood level can be maintained for a longer period than when the penicillin is given in solution. It will thus be of value in conditions such as gonorrhœa, in which long periods of administration of penicillin are not necessary; or in certain chronic infections in which a prolonged, rather than a quick action is required.

Dosage. The usual daily requirement of penicillin is 120,000 units and this is most effectively given by three-hourly injections (day and night) of 15,000 units. The duration of treatment varies considerably, but usually extends over five to twelve days. In very severe infections much larger doses may be given with complete safety. In syphilis and subacute bacterial endocarditis much larger doses are required; whilst in gonorrhœa the effective dose may usually be given within a period of twelve hours.

LOCAL ADMINISTRATION

Solutions. In sterile water or saline, usually 250 units per c.cm., are used for local treatment. They may be injected through tubes after dressing of a wound or they may be injected into abscesses after aspiration of the pus. Unless the penicillin can remain in contact with the infecting organism, it is of little value, so that irrigation of a wound is utterly useless. For intrathecal injection, as in meningitis, much higher concentrations of penicillin are required (up to 1,000 units per c.cm.) and it is advisable to use Seitz filtered solutions whenever possible. Such Seitz filtered solutions should also be used, when possible, for injection into the pleural cavity or joint cavities. In empyema, 26,000 to 75,000 units in 50 to 100 c.cm. are injected daily or on alternate days, into the pleural cavity. It is scarcely necessary to add that in most cases the local application of penicillin solution is supplemented by systemic administration.

Powders. These have not been so widely used as solutions, but when mixed with sufficient sterile sulphanilamide or sulphathiazole powder to produce a final con-

centration of 2,000 to 5,000 units per gramme, they have proved of value in the treatment of infected raw surfaces or wounds. Full aseptic precautions must be taken in the mixing of the constituents of the final powder. The powder is applied to the infected area once or twice daily by means of an insufflator.

Creams. The cream contains 250 units of penicillin per gramme. Applied daily it has proved effective in the treatment of superficial wounds and burns and in certain dermatological lesions.

Lozenges. Each lozenge contains 500 units. They have proved of value in the treatment of infections of the mouth and throat. To obtain satisfactory results the lozenges must not be chewed and must be retained in the mouth for as long a time as possible.

TOXIC REACTIONS

One of the great advantages of penicillin is its freedom from toxic reactions. Attention has already been drawn to the pain that may accompany intramuscular administration and the thrombosis that may follow intravenous administration, but neither of these has led to serious results. A pyrexial reaction may occasionally be encountered, which may be due either to impurities in the penicillin or to pyrogen in the distilled water. Occasionally skin reactions have been reported from the use of penicillin creams and ointments, and it may well be that these may prove more troublesome unless discrimination is exercised in the use of such creams and ointments.

CONCLUSION

It is clearly impossible in the space available to give a list of the conditions in which penicillin is the treatment of choice, but certain principles may be laid down. In all serious infections with penicillin-sensitive organisms, penicillin is the treatment of choice, e.g. septicaemia, puerperal sepsis, acute cellulitis, acute osteomyelitis and cavernous and lateral sinus thrombosis. Penicillin should always be used in acute infections due to organisms sensitive to penicillin but resistant to the sulphonamides. In surgical conditions, such as gas-gangrene, infections of the hand, and empyema, it must never be forgotten that in addition to the administration of penicillin, treatment must also be given in accordance with the best surgical principles.

Penicillin is not the end-all and be-all of treatment; the ill patient, in addition to penicillin, requires the full range of nursing and general medical supervision that were the mainstay of treatment in the days preceding this chemotherapeutic era. Rest, nursing, fresh air and diet are as vital a part of the treatment of the sick individual as they have been in the past.

PUBLISHER'S ANNOUNCEMENTS

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Edited by

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